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RESAMPLING STUDY

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16. Abstract A comparison of the nearest neighbor and cubic convolution resampling algorithms was performed. The two algo ithms were applied to a variety of images extracted from Landsat MSS data. Results obtained demonstrate that (1) cubic convolution can cause spreading of small features and can introduce noticeable overshoot (ringing) into the data, (2) cubic convolution attenuates the high spatial frequencies compared to the original and nearest neighbor resampled data, and (3) cubic convolution generally produces photographic products of superior visual quality. Although investigated in this study, the effects of the resampling algorithms on multispectral classification were not conclusively determined due to the small number of images tested.					
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PREFACE

This is the final report describing the resampling study performed by IBM for the NASA Goddard Space Flight Center under modifications 6 through 9 of contract NAS5-21865. The objective of this effort was to compare the nearest neighbor and cubic convolution resampling algorithms as applied to Landsat MSS data. The comparison was made by evaluating the effects of the resampling algorithms on each of the following categories:

- o "Point source" objects
- o Spatial frequency content of the data
- o Areas of uniform radiance
- o Multispectral classification
- o Temporal registration
- o Human analysis of the images

This report describes the work that was performed, presents copies of the results generated, analyzes those results, and presents conclusions drawn from them.

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Section 1. SUMMARY OF EFFORT

Five groups of data sets were processed for this investigation. Each was resampled with the nearest neighbor and cubic convolution resampling algorithms, and a comparison of the resulting data arrays was made by evaluating various photographic and statistical products. For a given data set, the sampling lattice used for nearest neighbor resampling was identical to that used for cubic convolution. Any differences in the resulting digital arrays are therefore due solely to the properties of the resampling algorithms. In preparing the photographic products, the original and resampled versions of each data array were processed identically. Hence any differences in the resulting prints are also due solely to the resampling algorithms.

All film products were generated from recordings made on the IBM Drum Scanner/Plotter using a 100 μ m square spot. For data arrays whose pixels have a 1.4:1 aspect ratio, the ground scales of the film recordings are approximately 1:560000 horizontally and 1:790000 vertically. For arrays whose pixels have a 1:1 aspect ratio, the ground scale of the recordings is approximately 1:500000 in both directions. Ten-power enlargements were made of all film recordings. These have correspondingly increased ground scales (e.g., 1:79000).

The data sets processed are listed in Figure 1. The generated products are listed in Figure 2 and described below.

Data Set A. - Point Source Objects

To determine the effects of the resampling algorithms on single-pixel, bright objects, a data set containing images of the mirrors placed by W. E. Evans in the vicinity of Reston, Virginia in October 1974, was used. The intensity values surrounding each mirror in the original and resampled arrays were printed. Since the mirrors were within four or five pixels of each other, an 18 pixel by 15 line array was sufficient to contain all the relevant data values. These array printouts are presented in Figures 3 through 10. Figure 3 contains a contact print of the data set, and Figures 5 through 7 contain 10-power enlargements. The locations of the mirrors are marked on the photographic products and data printouts.

Data Set B. - Spatial Frequency Content of the Data

Three arrays were selected to contain features with high spatial frequency content, such as road networks and airports. Each array, in both its original and resampled forms, consists of 128 lines of 128 pixels per line. To determine the effect of resampling on spatial frequency in the horizontal direction, each row (horizontal line) in each array was

transformed using the Fast Fourier Transform (FFT) algorithm. For each line, the power in each frequency was computed from the transform, and, for a given array, the average power was computed as the component-wise average of the power of the 128 lines. To determine the comparable effect in the vertical direction, this process was repeated for each column (vertical line) in the three arrays. Three standard operations were applied to each line of the data before it was transformed:

- (1) The mean was removed.
- (2) A window was applied (the window was a cosine bell applied to 1/10 of the data at each end).
- (3) 128 pad values of zero were appended.

The resulting power plots are shown in Figures 20 - 37.

In addition to the spatial frequency analysis, the original and resampled arrays were plotted, contact printed (Figure 4), and enlarged (Figures 11 - 19). The generated photographic products were evaluated by an experienced photointerpreter as to overall quality, clarity, resolution, and information extraction potential.

Data Set C. - Areas of Uniform Radiance

To determine how the resampling algorithms affect areas of near uniform radiance, two such areas were selected: one near Lake of the Woods, Virginia, and the other in the Chesapeake Bay southeast of Point Lookout. The two areas were resampled with both algorithms. Shadeprints are presented in Figures 38 through 43.

Data Set D. - Multispectral Classification and Temporal Registration

A systematic geometric correction was defined for a subimage of scene 2183-16433 which contained Lacie Intensive Test Site #2 in Hand County, South Dakota. Geometric correction parameters were then derived which would register the corresponding area of scene 2165-16435 with it. The Hand County site was chosen for the availability of detailed ground truth maps for a 5 x 6 nautical mile segment. The ground cover in this segment, with the exception of about 2% of the area, consisted of spring wheat, oats, corn, and pasture/grasses, their exact proportions being known from the ground truth inventory.

The ground truth information available for this site is included as Appendix A of this report. It shows that the fields involved varied in size from 1 to 635 acres. Of the 275 fields, 60% were 40 acres or less in size, 27% were from 40 to 100 acres, and 13% were larger than 100 acres. Approximately 55% of the fields had aspect ratios of 2:1 or greater. In most cases, the field boundaries were regular and aligned along section lines.

All four bands of each subimage were resampled with the two resampling algorithms. Contact prints (Figures 44 and 45) and 10X enlargements (Figures 46 -69) for all four bands of each of the two temporally separated scenes were generated and evaluated by an experienced photointerpreter. (Notice that Figures 50 - 57 and 62 - 69 are rotated to fit on the page, even though the figure titles are not.)

The temporal registration that was done for this data set, and for data set e below, used relative control points that were correlated between the reference image and the register image. Prior to the correlation, the prototype features (the windows) and the search areas were resampled with a one-dimensional cubic convolution algorithm to remove the effect of sampling delay and intersweep earth rotation. Based on the locations of the window areas within the corresponding search areas, geometric correction parameters which would effect the temporal registration were derived. This one set of parameters was used to drive both the nearest neighbor and cubic convolution resampling algorithms.

The digital arrays generated by the resamplings were classified using the multispectral classification capabilities of the Earth Resources Interactive Processing System (ERIPS) at IBM - Houston. The accuracy of the proportion estimates obtained by the classification of each resampled version of the data was used as a basis for evaluating the resampling techniques.

The classification model which was used in this study assumes that the data corresponding to each distinct ground cover constitute a normal population. This is the model generally adopted in the classification of remotely sensed data. Implementation of the maximum likelihood classification scheme with this model consisted of the following steps:

- o Designation of training areas for each distinct ground cover from the ground truth maps
- o Computation of the statistics (mean vectors and covariance matrices) to characterize each type of ground cover (class).
- o Classification of the data into the defined classes by a maximum likelihood rule.
- o Generation of classification maps and/or summaries of classification results for training and test fields.

There were mainly two considerations in the selection of training fields from the ground truth inventory. First, it was desired to define training areas to be entirely in the interior of fields so that the boundary pixels, where the larger differences due to resampling show up, would not be included. This eliminated narrow, small fields from being included in training. The second consideration was to give a roughly proportional representation in terms of size and number of training fields to each of the four major ground cover types: spring wheat, oats, corn, and pasture/grasses. Once the training fields were defined, mean and standard deviation statistics were computed for each class. Using the maximum likelihood decision rule, the test and training fields were classified for each image separately. Each pixel was assigned to one of the classes defined by the training fields.

The areal proportion estimate of each ground cover category was computed directly as the proportion of pixels assigned to classes defined by the training fields of this category. As noted earlier, roughly 2% of the area had ground cover unlike any represented by the training fields. It was assumed that these pixels would be classified into the defined categories proportionally by area. The proportion estimates obtained are summarized in Figure 70.

Data Set E. Temporal Registration

Scene 1921-18022 was used as the reference image and 1813-18063 was the register image. Only band 5 of two subimage areas was processed. Contact prints (Figures 80 and 81), 10X enlargements (Figures 82-93), and shade-prints (Figures 94-105) were generated. The photographic products were examined by an experienced photointerpreter.

Section 2. EVALUATION AND CONCLUSIONS

The output generated by the effort described above was evaluated, resulting in the following observations and conclusions:

1. Cubic convolution may introduce "overshoot" into the resampled data. This effect is clearly seen in the black borders surrounding the mirrors in the vicinity of Reston, VA. (Figures 7A and 7B) and the small white area at the left center of area 2, 1921-18022 (Figure 87). Although not demonstrated in this investigation, theoretical considerations imply that the overshoot is highly dependent on the sampling lattice. A slight shift of the input space relative to the sampling lattice may produce significantly altered resampled values at the same lattice points. In this sense, and in this admittedly extreme situation, cubic convolution is an inaccurate algorithm for interpolating to inter-pixel values.
2. Cubic convolution may cause a significant spreading of small features. This spreading was noticed more severely in the vertical (along-track) as opposed to the horizontal direction. In the original and nearest neighbor data, the southeastern mirror near Reston, VA appears to have affected only one horizontal line, but in the cubic convolution data, four lines (including the overshoot) are affected.
3. Cubic convolution can effectively remove discontinuities in the data due to subpixel offsets. Such offsets are introduced into the Landsat MSS data by sampling delay, differences in scan line length, and the intersweep earth rotation effect. Nearest neighbor resampling cannot effectively remove these discontinuities and, as a result, photographic products generated from the cubic convolution data are visually much smoother than comparable products generated from nearest neighbor data. Under appropriate conditions, nearest neighbor data gives the appearance of containing two pixel discontinuities.

Incorporation of a correction for these distortions is optional in either resampling algorithm. It was not included in the resamplings of data sets A, B, and C since the characteristics investigated in these data sets (spreading, effect on spatial frequency, etc.) do not depend on subpixel effects. However, to permit a more accurate temporal registration, the subpixel effects were compensated for in data set D and E. The compensation was incorporated in both the cubic convolution and nearest neighbor algorithms. A comparison of linear features in data sets D and E demonstrates the smoothing effect cubic convolutions can provide in photographic products.

4. The photointerpreter who evaluated the photographic products found that, compared to the original data, nearest neighbor resampling produces a geometric "dappling" of the finer details in the data. There is not a smooth transition among neighboring pixels of slightly differing gray-scale values (see Figure 52). Straight edges such as field patterns, runways and roads appear more stepped and jagged than in the original data (Figure 52, Figure 18). At times however, there appears to be an enhancement over the original data of smaller terrain patterns (northeast quadrant, Figure 86).

The cubic convolution algorithm reduces the "dappled" appearance of small terrain details (Figure 63 and Figure 67) and makes small stream patterns appear more realistic (Figure 67). It reduces the stepped appearance along the edges of fields (Figure 65 and Figure 69) and on airfield runways (Figure 18 and Figure 19), and it appears to promote natural appearing patterns in areas with finer terrain detail (Figure 87, northeast quadrant). In small, single pixel areas of high contrast relative to their surroundings, the algorithm tends to "overshoot" and produce radiometric values of almost certainly misleading contrast (Figure 7a, 7b).

As a result, it appears that cubic convolution is preferable to nearest neighbor in processing the image data to further its interpretability. Cubic convolution does the better job of smoothing edges known to be straight. It promotes a gradational gray-shade transition among smaller terrain details which increases the interpreter's ability to recognize otherwise obscure and subtle terrain patterns. However, it has the negative attribute of "overshooting" small areas of high contrast relative to the surroundings, and thereby promotes a misleading pattern.

5. Cubic convolution attenuates the high spatial frequencies, whereas nearest neighbor has essentially no effect on spatial frequencies. The attenuation caused by cubic convolution was nearly identical in both the horizontal and vertical directions and was noticed equally in all cases tested. Given that the transforms which were computed used 128 points, the lowest spatial frequency detected in the horizontal direction (excluding the 'DC' or constant term) is

$$\frac{1}{128 \text{ Samples} \times 57.2 \text{ Meters/Sample}} = \frac{1}{7321.6 \text{ Meters}}$$

and the highest spatial frequency is

$$\frac{1}{2 \text{ Samples} \times 57.2 \text{ Meters/Sample}} = \frac{1}{114.4 \text{ Meters}}$$

Within this range, the power plots show that cubic convolution begins attenuating spatial frequencies at a frequency of approximately

$$\frac{44}{(128 \times 57.2) \text{ Meters}} = \frac{1}{166.4 \text{ Meters.}}$$

The attenuation becomes progressively more severe until the power in the highest frequency (1/114.4 Meters) is attenuated by approximately a factor of 2.

The same occurrence is noticed in the vertical direction. In this case, the range of spatial frequencies is

$$\frac{1}{128 \times 79} = \frac{1}{10112 \text{ Meters}} \quad \text{to} \quad \frac{1}{2 \times 79} = \frac{1}{158 \text{ Meters.}}$$

The attenuation begins at a spatial frequency of approximately

$$\frac{44}{(128 \times 79)} = \frac{1}{229.82 \text{ Meters.}}$$

and the attenuation is again approximately a factor of two at the highest frequency.

6. In areas of near-uniform radiance, the differences in the output due to choice of resampling algorithm are minimal. Cubic convolution data does have a lower standard deviation in such areas (and in the image as a whole). As a result, the cubic convolution algorithm may be considered preferable in that it reduces the noise in the input data.
7. The multispectral classification experiment performed as part of this investigation suggests that the differences due to choice of resampling algorithm in the proportion estimates for various ground cover types are insignificant (see Figure 70).

Analysis of the data shows that: (a) although the differences in proportion estimates are not significant, the number of pixels classified differently in the two resampled versions is large for each scene; and, (b) the differences in the two resampled versions are characterized by zero mean Gaussian noise.

The interiors of the fields in cubic convolution images are more homogeneous (lower standard deviations) and the transitions at the field boundaries are smoother as compared to the nearest neighbor images. Comparison of the field structure in the images with the ground truth maps showed the cubic convolution images to be 'truer' to the scene. This is a qualitative judgment based on visual comparisons of field sizes and boundaries.

The classification results obtained should be qualified by the following considerations.

- a. The classification procedure is usually based on a model for the data. The model generally used with remotely sensed agricultural data assumes that the data corresponding to each distinct ground cover type constitute a normal (mixture) population. This model was adopted in this study even though it fails the test of statistical hypothesis that the mean vectors of any two fields of the same type have been drawn from a single normal distribution. This points to a weakness in the model for the data on which the classification was based and, therefore, a weakness in using these classification results as a basis for evaluation of the resampling techniques.
- b. From the viewpoint of classification, the smoothing mechanism of cubic convolution would introduce additional spatial correlation in the data and reduce the within-field variability. Note that even without resampling, spatial correlation is introduced in the data by the sensor dynamics, atmosphere, and the current sampling procedures. The effect of increased correlation on classification is difficult to study analytically; however, the following qualitative remarks apply.
 - o The training data, corresponding to contiguous pixels in a field, are assumed to be independent. Clearly, with cubic convolution resampling, this assumption is harder to justify. The estimates of the class covariance matrices obtained as though the data were independent would be biased and the spread in the data would be underestimated.
 - o The smoothing process would tend to decrease the 'distance' (e.g., divergence, Bhattacharyya distance) between different classes. This would be particularly true for scenes with narrow fields.
 - o The separability of data corresponding to different ground covers in a scene changes with time. The impact of the smoothing process of cubic convolution on classification, therefore, depends upon the time of data acquisition and would be greater when this separability is small and vice versa.

With the training areas defined so as not to include boundary pixels, the nearest neighbor resampling would not affect the training statistics and its impact on classification would be seen only in the boundary pixels whose identities got changed in the resampling process. Clearly, this impact would vary depending upon the field structure in the scene.

In summary, the classification results have not provided a conclusive basis for the evaluation of the two resampling techniques. The images generated by cubic convolution are visually of a superior quality and 'truer' to the scene on the ground. This, however, does not necessarily mean that the cubic convolution images can be classified more accurately by a given classifier. Nor does it mean that a classifier can not be developed to give better classification results with the cubic convolution images as compared to those obtained with the nearest neighbor images, or as compared to the results obtained with the given classifier with the images generated by either resampling procedure.

8. Regarding temporal registration, images produced by cubic convolution resampling have a smoother visual quality and, correspondingly, a lower standard deviation in near-uniform areas. If the images generated by a temporal registration correction are to be differenced and used for change detection, this smoothing effect of cubic convolution may be desirable, since it may reduce the "speckling" of the difference image. Alternatively, if the temporally registered images are to be used as additional channels in a multispectral classification experiment, results presented in the preceeding paragraph suggest that either resampling algorithm may work equally well.

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Section 3. RECOMMENDATIONS

1. Variations in the present cubic convolution algorithm should be investigated to determine whether they would lead to improved results. Possible variations are:
 - a. Modify the cubic convolution interpolation done in the horizontal direction to account for oversampling. As presently implemented, identical interpolations are performed in both the horizontal (oversampled) and vertical (non-oversampled) directions.
 - b. Apply cubic convolution in the horizontal direction only. It is in this direction that subpixel discontinuities are known to exist, and, by not resampling in the vertical direction, the undesirable overshoot occurrences noticed in Data Set A may be avoided. Processing loads would be significantly reduced if this were done.
2. A more complete investigation of the effects of resampling on multispectral classification should be performed. The proportion estimates obtained with the two temporally separated images of this experiment (either resampled version) are significantly different from each other. These differences arise due to the changes with time in the spectral separability of data for different ground cover types in the scene. The results obtained with the earlier image are far too different from the ground truth in each case to be of any value in a study of the impact of resampling procedures. Those obtained with the second image, though closer to the ground truth by comparison, only constitute a sample of one from which to draw a conclusion. A meaningful conclusion may be possible from a larger study involving several scenes with multiple acquisitions of imagery over each.
3. To determine which resampling method reconstructs "truth" more accurately in the photographic products, "truth" must be known. High resolution aircraft photography of an area, taken at the same time and in the same spectral band, may be used as a reference. Such an evaluation should be done to determine whether cubic convolution is introducing patterns (e.g., moires) into the resampled data.

Data Set	Feature	Description	Scene and Band	Approximate Pixel Coordinates Of Subimage Center (Sample, Line)	Subimage Size Samples x Lines	Pixel Aspect Ratio	Type of Geometric Correction
A	Point Sources	Reston Mirrors	1800-15081-4,5	880,1610	100 x 100	1.4:1	Systematic
B	High Spatial Frequency	Aberdeen Proving Grounds		2240,180	128 x 128	1.4:1	Scene
		Wheaton, Md Road Network	1080-15192-4	1226,965			
C	Uniform Radiance	Andrews AFB Lake of the Woods	1080-15192-7	1555,1226 480,2050	100 x 100	1.4:1	Scene
		Chesapeake Bay SE of Point Lookout		3080,2291			
D	Classification/Temporal Registration	Lacie Intensive test site, Hand County #2, South Dakota	2183-16435 all bands 2165-16433 all bands	2355,1594 2410,1259	200 x 200	1:1	Systematic Temporal Registration
E	Temporal Registration	Area 1 Area 2 Both in vicinity of Monterey, California	1921-18022-5 1813-18063-5	1830,271 500,380 1718,452 377,557	200 x 200	1.4:1	Systematic Temporal Registration

Figure 1. Table of Data Set, Processed

Notes:

1. Band designations are those used for Landsat 1, for which the four spectral bands of the MSS were numbered 4 through 7 in order of increasing wavelength.
2. Systematic corrections are those which can be made without reference to the sensor data. Scene corrections and temporal registration require the use of control points which must be located in the sensor data.
3. A resampling of this data set to produce pixels with a 1:1 aspect ratio is described in Appendix B of this report.

Data Set	Feature	Contact Prints of Recordings With 100 μ m Spot	10X Enlargements	Data Printouts	Evaluation by Experienced PI	FFT	Shadeprints	Classification on ERIPS
A	Point Sources	X	X	X				
B	High Spatial Frequency	X	X		X	X		
C	Uniform Radiance						X	
D	Classification/Temporal Registration	X	X					X
E	Temporal Registration	X	X				X	

Figure 2. Table of Photographic and Statistical Products Generated

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band 4



band 5

Figure 3. Contact print of Reston mirrors, OR,NN,CC-1800-15081-4,5

OR NN CC



Aberdeen Proving Grounds



Suburban Road Network,
Wheaton, MD



Andrews Air Force Base

Figure 4. Contact print of Aberdeen, Wheaton and Andrews AFB,
OR,NN,CC-1080-15192-4



Figure 5a. 10X Enlargement of Reston Mirrors, OR-1800-15081-4



Figure 5b. 10X Enlargement of Reston Mirrors, OR-1800-15081-5

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Figure 6a. 10X Enlargement of Reston Mirrors, NN-1800-15081-4



Figure 6b. 10X Enlargement of Reston Mirrors, NN-1800-15081-5

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Figure 7a. 10X Enlargement of Reston Mirrors, CC-1800-15081-4



Figure 7b. 10X Enlargement of Reston Mirrors, CC-1800-15081-5

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PIXEL INTENSITY VALUES AROUND MIRRORS AT RESTON ORIGINAL DATA (800-15081-3)

LINE	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
LINE 44	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 45	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 46	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 47	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 48	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 49	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 50	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 51	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 53	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 54	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 55	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 56	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 57	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 58	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 59	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LINE 60	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Figure 8. Pixel value printouts around Reston mirrows, OR-1A00-1508 4,5

PIXEL INTENSITY VALUES AROUND MIRROR AT RESTON NEAREST NEIGHBOR 1800-15081-4
PRINTOUT OF INTENSITY VALUES OF PIXELS SURROUNDING SAMPLE 52, LINE 51

LINE 44	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
LINE 45	21	20	20	22	22	21	24	24	24	20	21	21	21	20	21	21	21	21
LINE 46	22	20	20	22	22	22	24	24	24	20	21	21	21	20	21	21	21	21
LINE 47	23	21	21	23	23	23	24	24	24	20	21	21	21	20	21	21	21	21
LINE 48	24	21	21	24	24	24	25	25	25	21	22	22	22	21	22	22	22	22
LINE 49	25	22	22	25	25	25	26	26	26	22	23	23	23	22	23	23	23	23
LINE 50	26	23	23	26	26	26	27	27	27	23	24	24	24	23	24	24	24	24
LINE 51	27	24	24	27	27	27	28	28	28	24	25	25	25	24	25	25	25	25
LINE 52	28	25	25	28	28	28	29	29	29	25	26	26	26	25	26	26	26	26
LINE 53	29	26	26	29	29	29	30	30	30	26	27	27	27	26	27	27	27	27
LINE 54	30	27	27	30	30	30	31	31	31	27	28	28	28	27	28	28	28	28
LINE 55	31	28	28	31	31	31	32	32	32	28	29	29	29	28	29	29	29	29
LINE 56	32	29	29	32	32	32	33	33	33	29	30	30	30	29	30	30	30	30
LINE 57	33	30	30	33	33	33	34	34	34	30	31	31	31	30	31	31	31	31
LINE 58	34	31	31	34	34	34	35	35	35	31	32	32	32	31	32	32	32	32
LINE 59	35	32	32	35	35	35	36	36	36	32	33	33	33	32	33	33	33	33
LINE 60	36	33	33	36	36	36	37	37	37	33	34	34	34	33	34	34	34	34

PIXEL INTENSITY VALUES AROUND MIRRORS AT RESTON NEAREST NEIGHBOR 1800-15081-5
PRINTOUT OF INTENSITY VALUES OF PIXELS SURROUNDING SAMPLE 52, LINE 51

LINE 44	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
LINE 45	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
LINE 46	14	13	13	14	14	14	14	14	14	13	14	14	14	13	14	14	14	14
LINE 47	15	14	14	15	15	15	15	15	15	14	15	15	15	14	15	15	15	15
LINE 48	16	15	15	16	16	16	16	16	16	15	16	16	16	15	16	16	16	16
LINE 49	17	16	16	17	17	17	17	17	17	16	17	17	17	16	17	17	17	17
LINE 50	18	17	17	18	18	18	18	18	18	17	18	18	18	17	18	18	18	18
LINE 51	19	18	18	19	19	19	19	19	19	18	19	19	19	18	19	19	19	19
LINE 52	20	19	19	20	20	20	20	20	20	19	20	20	20	19	20	20	20	20
LINE 53	21	20	20	21	21	21	21	21	21	20	21	21	21	20	21	21	21	21
LINE 54	22	21	21	22	22	22	22	22	22	21	22	22	22	21	22	22	22	22
LINE 55	23	22	22	23	23	23	23	23	23	22	23	23	23	22	23	23	23	23
LINE 56	24	23	23	24	24	24	24	24	24	23	24	24	24	23	24	24	24	24
LINE 57	25	24	24	25	25	25	25	25	25	24	25	25	25	24	25	25	25	25
LINE 58	26	25	25	26	26	26	26	26	26	25	26	26	26	25	26	26	26	26
LINE 59	27	26	26	27	27	27	27	27	27	26	27	27	27	26	27	27	27	27
LINE 60	28	27	27	28	28	28	28	28	28	27	28	28	28	27	28	28	28	28

Figure 9. Pixel value printouts around Reston mirrors, NN-1800-15081-4,5

PIXEL INTENSITY VALUES AROUND MIRRORS
PRINTOUT OF INTENSITY VALUES OF PIXELS SURROUNDING SAMPLE 52, LINE 51
RESTON CUBIC CONVOLUTION 1800-15081-4

LINE 44	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
LINE 45	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
LINE 46	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
LINE 47	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
LINE 48	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LINE 49	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
LINE 50	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
LINE 51	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
LINE 52	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
LINE 53	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
LINE 54	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
LINE 55	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
LINE 56	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
LINE 57	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
LINE 58	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
LINE 59	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
LINE 60	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

PIXEL INTENSITY VALUES AROUND MIRRORS AT RESTON CUBIC CONVOLUTION 1800-15081-5
PRINTOUT OF INTENSITY VALUES OF PIXELS SURROUNDING SAMPLE 52, LINE 51

LINE 44	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
LINE 45	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
LINE 46	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
LINE 47	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
LINE 48	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
LINE 49	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24	24
LINE 50	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25
LINE 51	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
LINE 52	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27	27
LINE 53	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
LINE 54	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29	29
LINE 55	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
LINE 56	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31
LINE 57	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
LINE 58	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
LINE 59	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34
LINE 60	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35	35

Figure 10. Pixel value printouts around Reston mirrors, CC-1800-15081-4,5



Figure 11. 10X Enlargement of Aberdeen Area, OR-1080-15192-4

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Figure 12. 10X Enlargement of Aberdeen Area, NN-1080-15192-4



Figure 13. 10X Enlargement of Aberdeen Area, CC-1080-15192-4

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Figure 14. 10X Enlargement of Wheaton Area, OR-1080-15192-4



Figure 15. 10X Enlargement of Wheaton Area, NN-1080-15192-4

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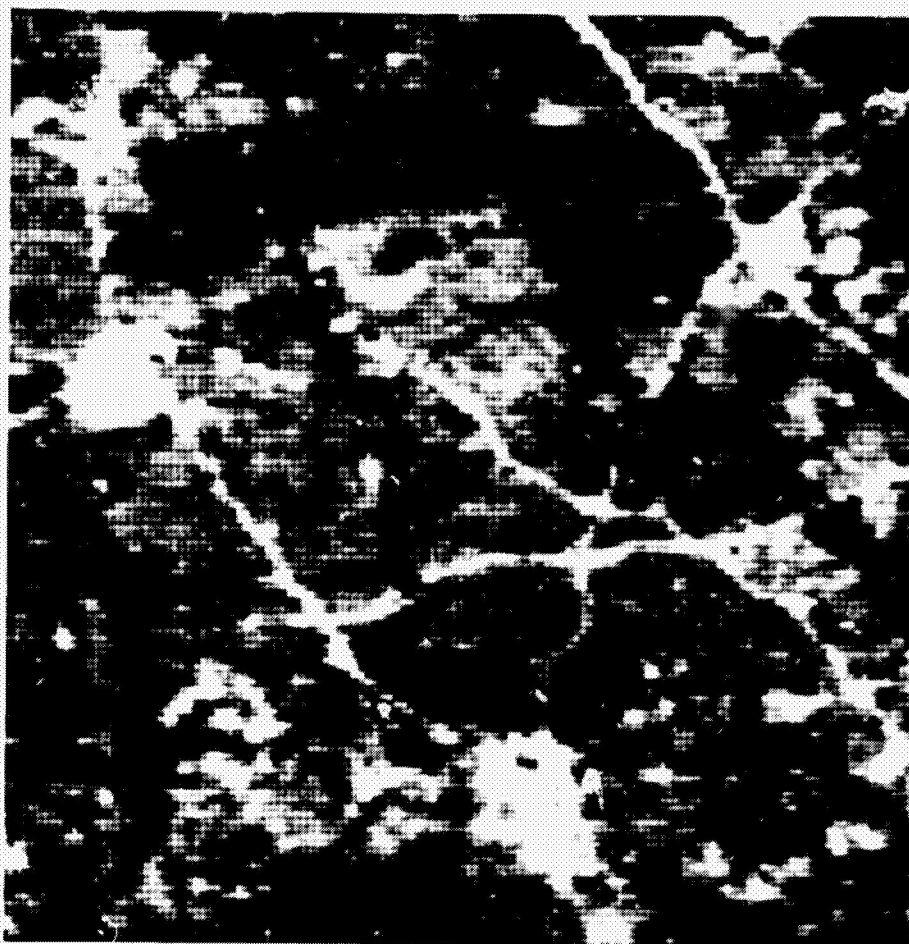


Figure 16. 10X Enlargement of Wheaton Area, CC-1080-15192-4



Figure 17. 10X Enlargement of Andrews AFB, OR-1080-15192-4

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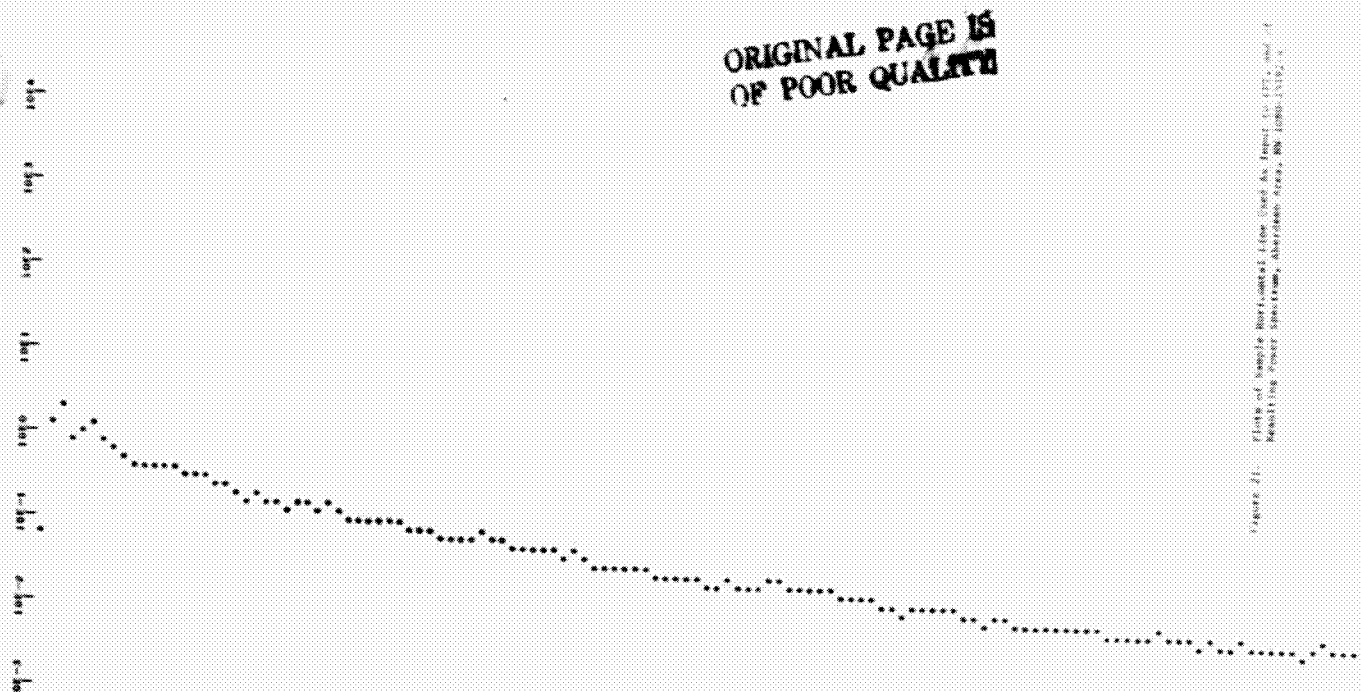


Figure 13. 10.1 Enlargement of Andrews AFB, NN-1080-15192-4



Figure 19. 10X Enlargement of Andrews AFB, CC-1080-15192-4

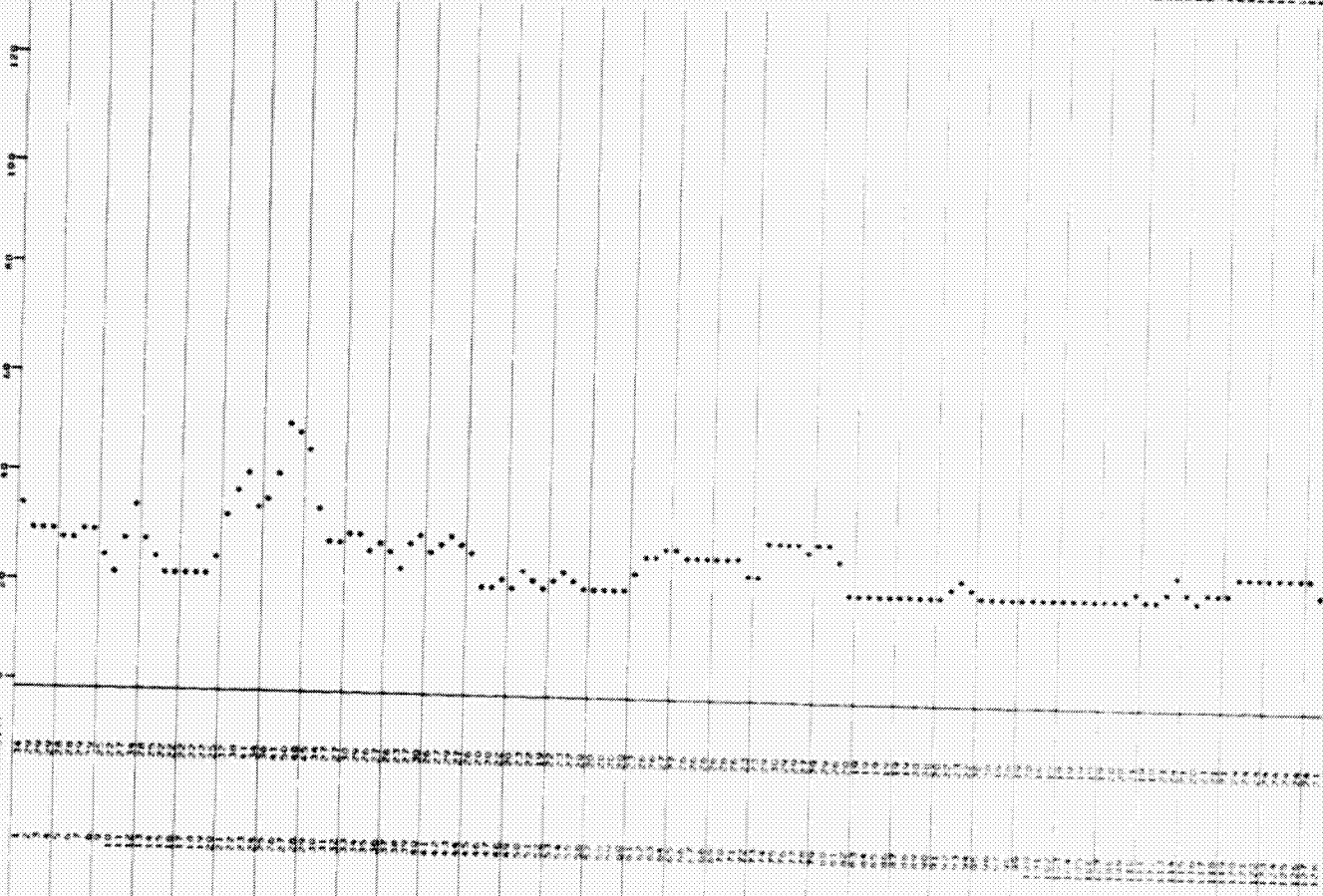
SPATIAL FREQUENCY ANALYSIS FOR HORIZONTAL LINES. MM-1000-10100-4
 POWER AVERAGED OVER 128 LINES. WENT AVERAGE POWER(1) = 1.0000000000000000
 1 IS THE INDEX OF THE FOURIER COEFFICIENT



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Figure 21. Plot of Sample Horizontal Line Used As Input to FFT, and of Resulting Power Spectrum, Averaged Area, BN 1000-10100-4

PLOT OF PIXEL INTENSITY VS POSITION IN HORIZONTAL LINE 44
 DATA FROM 1000-10100-4 SURFACE OF ARTIFACTS INVOLVING ENDOUS - NEAREST INTERIOR



THE PIXEL INTENSITY RANGE OF 0 TO 129 HAS BEEN SCALED TO AN EXTENT OF 0.0000000000000000 TO 0.0000000000000000



For other information, please contact:

SPATIAL FREQUENCY ANALYSIS 128 VERTICAL LINES 100-1000-15192-A ARDENEN
 POWER AVERAGED OVER 128 LINES WERE AVERAGE POWERED IN A SIMULATION OF 1/1000 LINES
 1 IS THE INDEX OF THE FOURIER COEFFICIENT

100-3 100-2 100-1 1000 1001 1002 1003 1004

100-3 100-2 100-1 1000 1001 1002 1003 1004

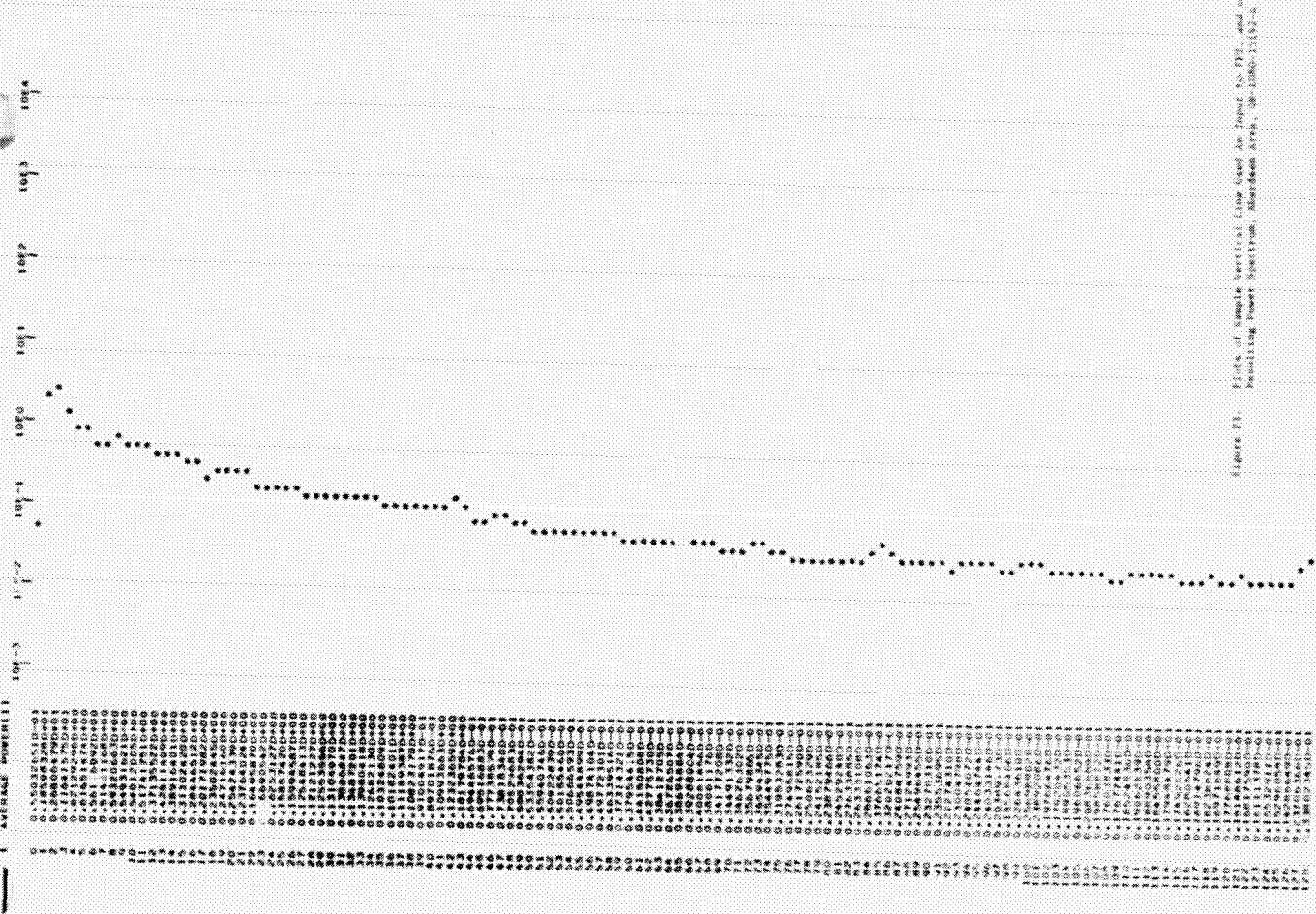


Figure 71. Plot of sample vertical line used for 1001-1004, and of resulting power spectrum, Ardenen, 100-1000-15192-A.

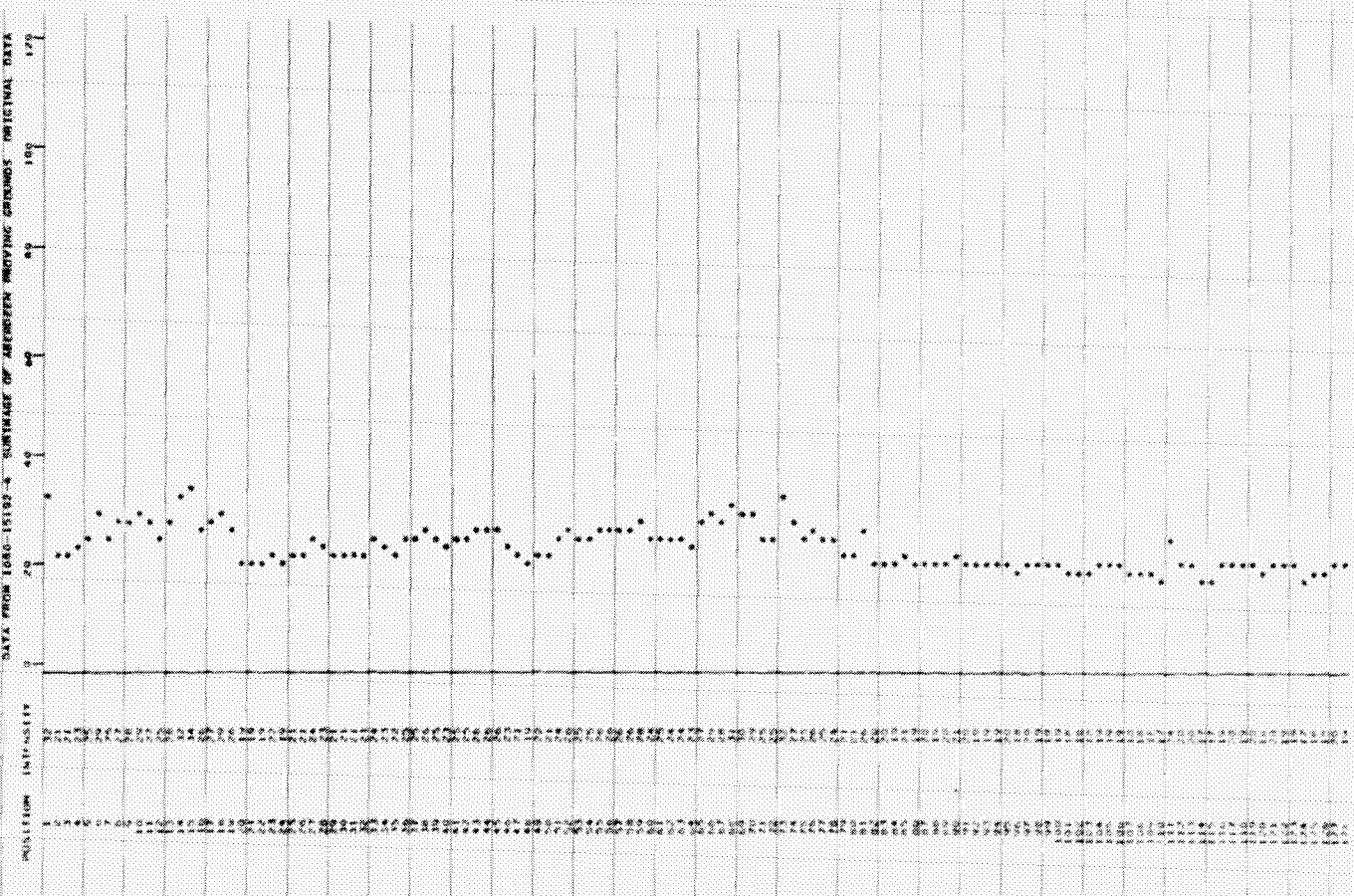
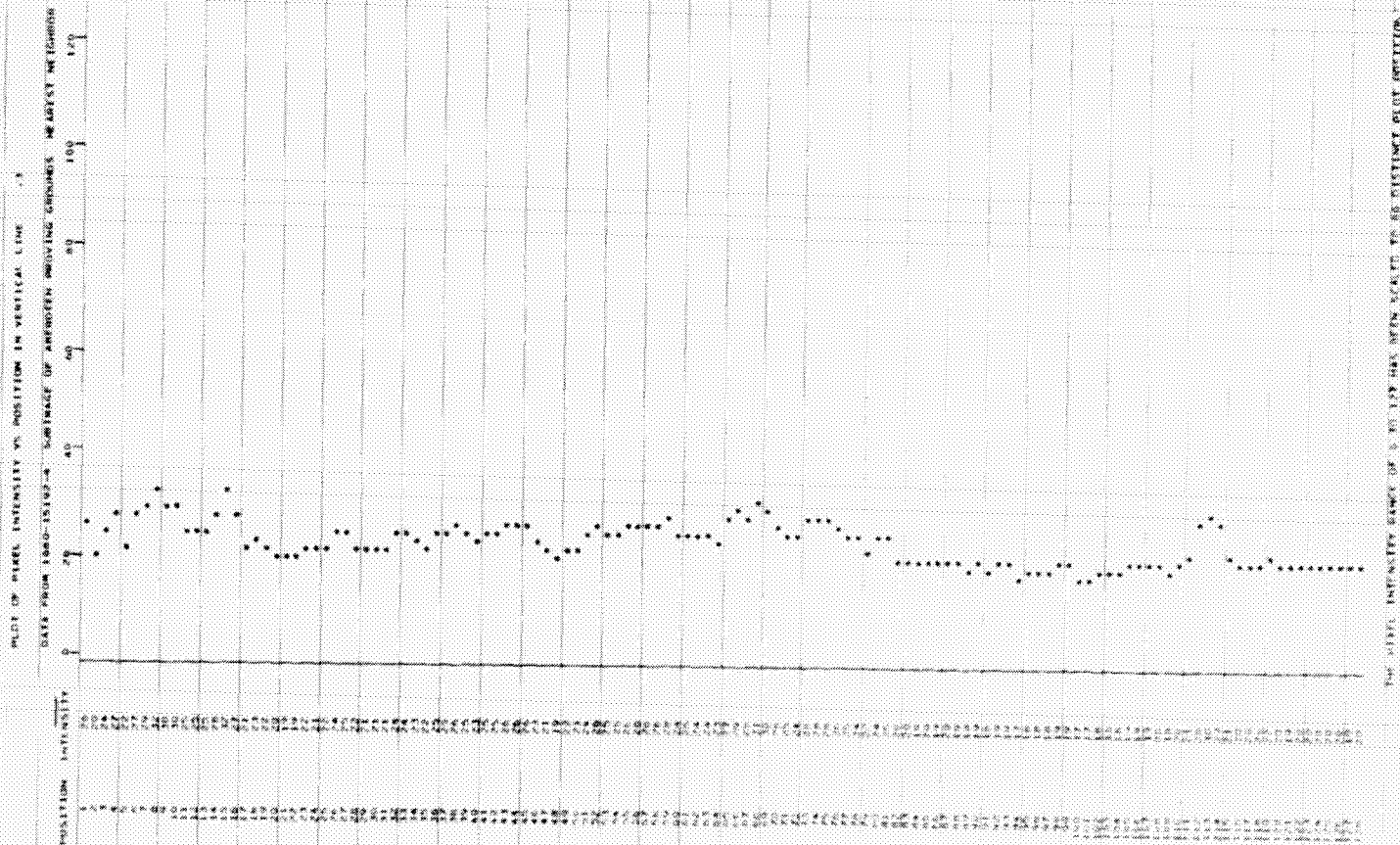
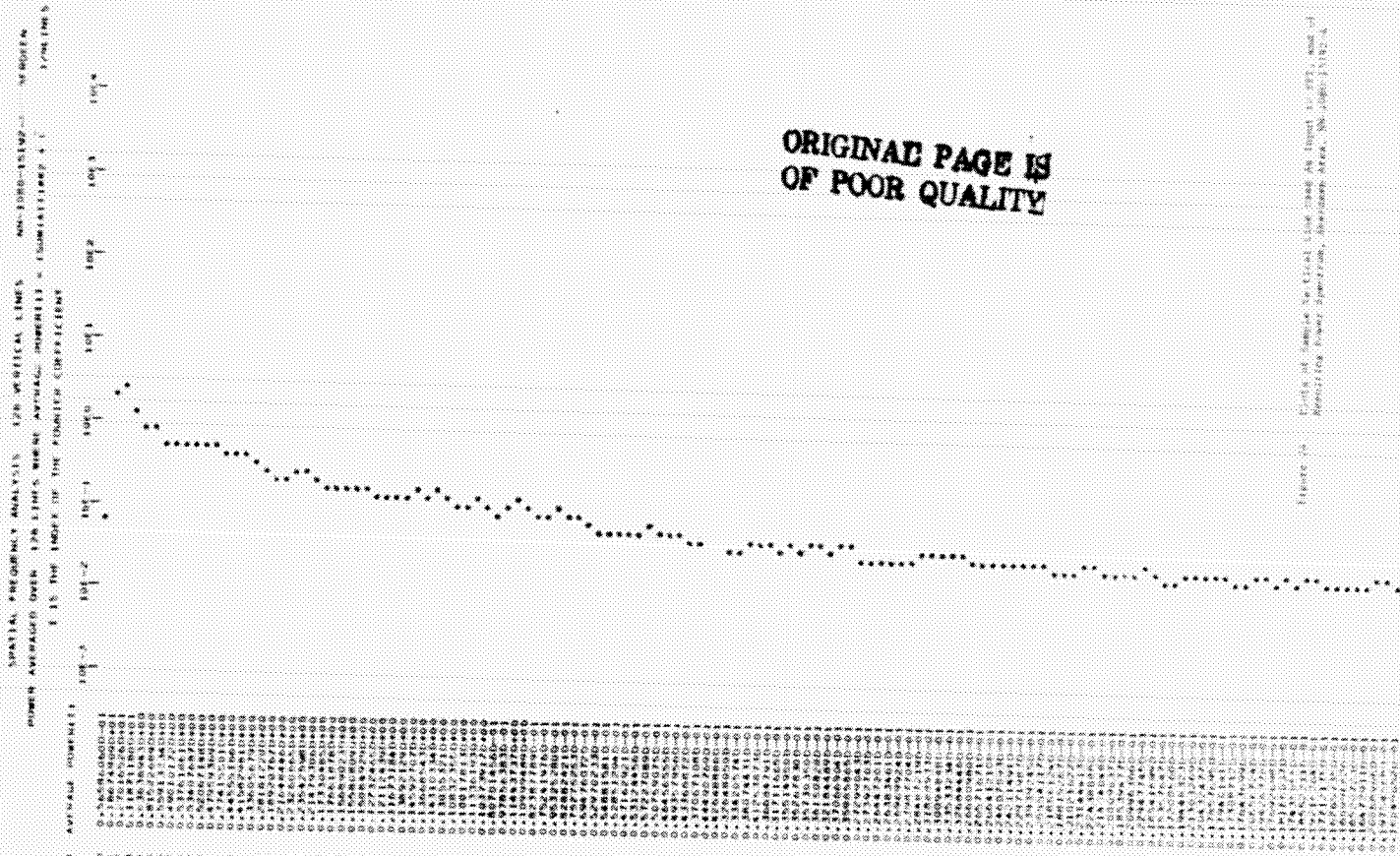


Figure 72. Plot of sample vertical line used for 1001-1004, and of resulting power spectrum, Ardenen, 100-1000-15192-A.

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SPATIAL FREQUENCY ANALYSIS, 100 HORIZONTAL LINES, NW-1000-1 02-4, WHEATON
 POWER AVERAGED OVER 100 LINES, WHERE AVERAGE POWER(1) = SUM(POWER(1) - 64110000)/100
 1 IS THE INDEX OF THE POWER COEFFICIENT

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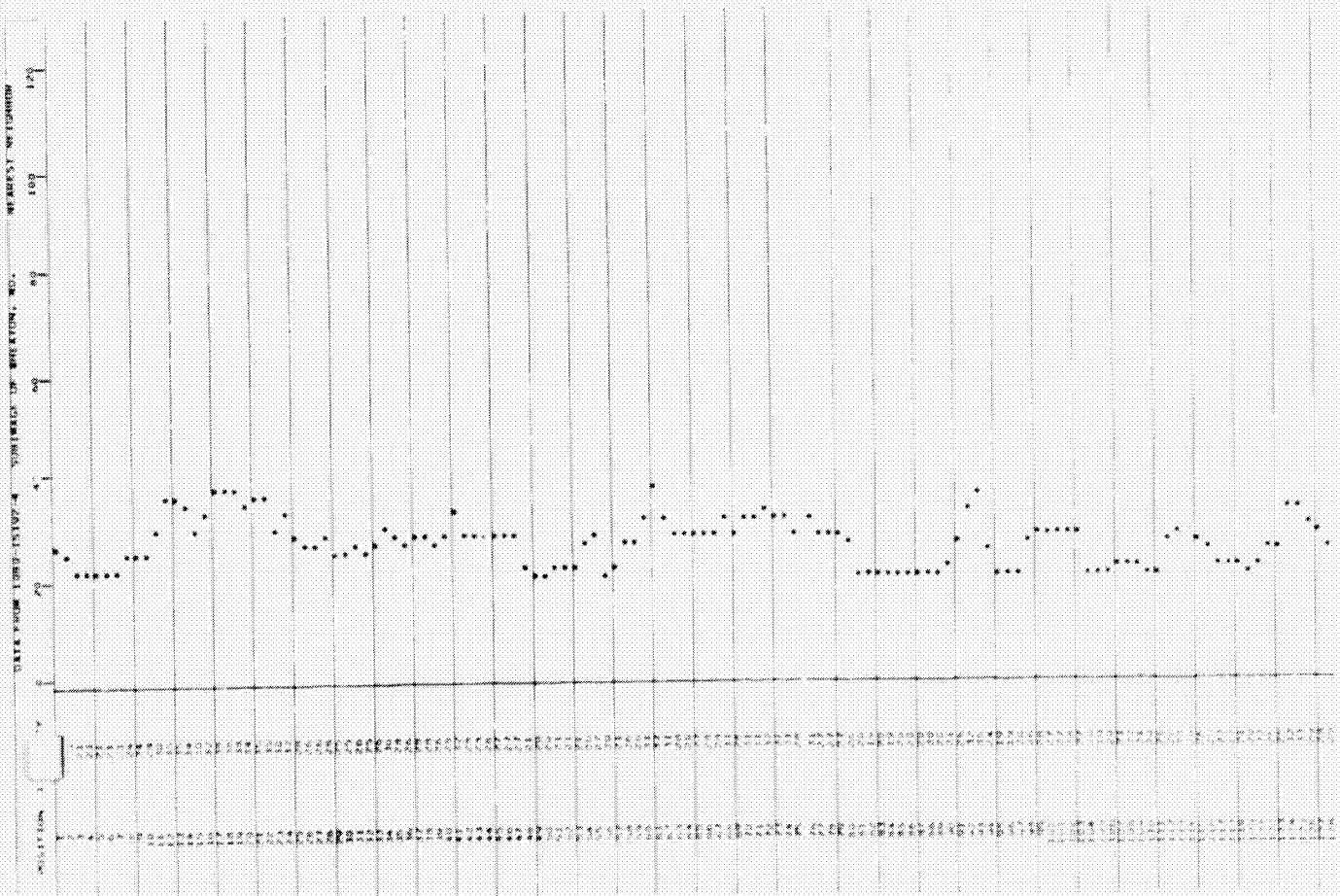
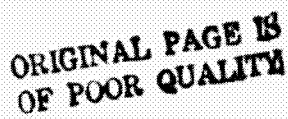


Figure 27. Plot of sample dissimilarity line used as input to FFT, and of resulting power spectrum, Wheaton Area, NW-1000-15192-4

1	0.1100000000
2	0.1100000000
3	0.1100000000
4	0.1100000000
5	0.1100000000
6	0.1100000000
7	0.1100000000
8	0.1100000000
9	0.1100000000
10	0.1100000000
11	0.1100000000
12	0.1100000000
13	0.1100000000
14	0.1100000000
15	0.1100000000
16	0.1100000000
17	0.1100000000
18	0.1100000000
19	0.1100000000
20	0.1100000000
21	0.1100000000
22	0.1100000000
23	0.1100000000
24	0.1100000000
25	0.1100000000
26	0.1100000000
27	0.1100000000
28	0.1100000000
29	0.1100000000
30	0.1100000000
31	0.1100000000
32	0.1100000000
33	0.1100000000
34	0.1100000000
35	0.1100000000
36	0.1100000000
37	0.1100000000
38	0.1100000000
39	0.1100000000
40	0.1100000000
41	0.1100000000
42	0.1100000000
43	0.1100000000
44	0.1100000000
45	0.1100000000
46	0.1100000000
47	0.1100000000
48	0.1100000000
49	0.1100000000
50	0.1100000000
51	0.1100000000
52	0.1100000000
53	0.1100000000
54	0.1100000000
55	0.1100000000
56	0.1100000000
57	0.1100000000
58	0.1100000000
59	0.1100000000
60	0.1100000000
61	0.1100000000
62	0.1100000000
63	0.1100000000
64	0.1100000000
65	0.1100000000
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119	0.1100000000
120	0.1100000000

THE ABOVE POWER SPECTRUM IS THE 100 HORIZONTAL LINES, NW-1000-15192-4



Year	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

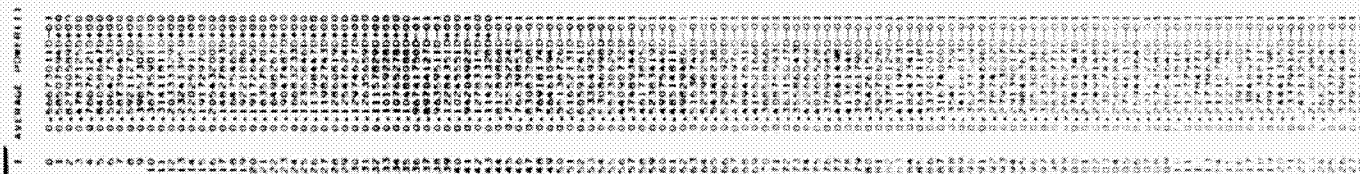




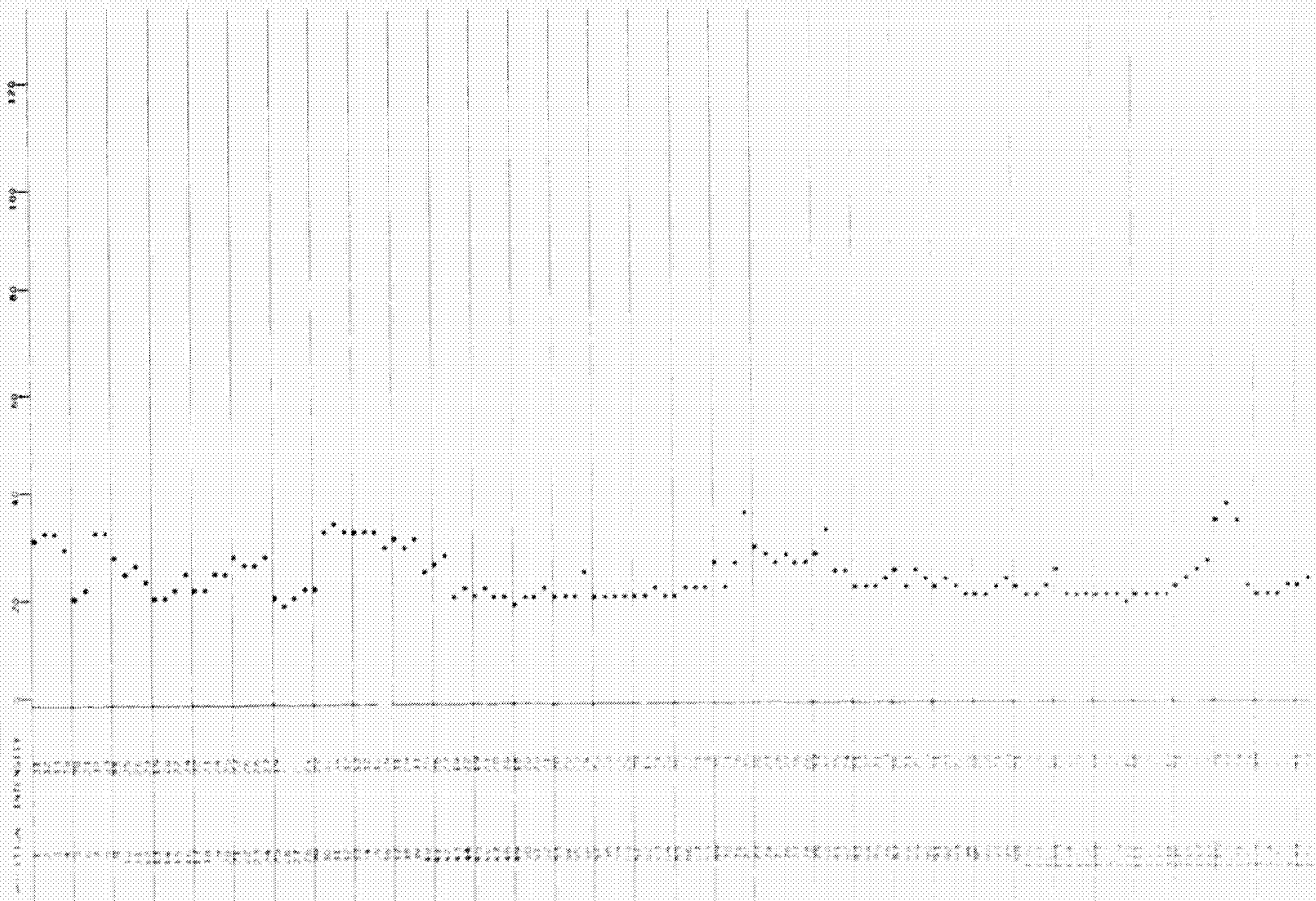
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SPATIAL FREQUENCY ANALYSIS 126 VERTICAL LINE'S NON-1080-18102-4 DM
AVERAGE OVER 126 LINE'S WHERE AVERAGE POWER(1) = 150011002 + 0011 LINE'S
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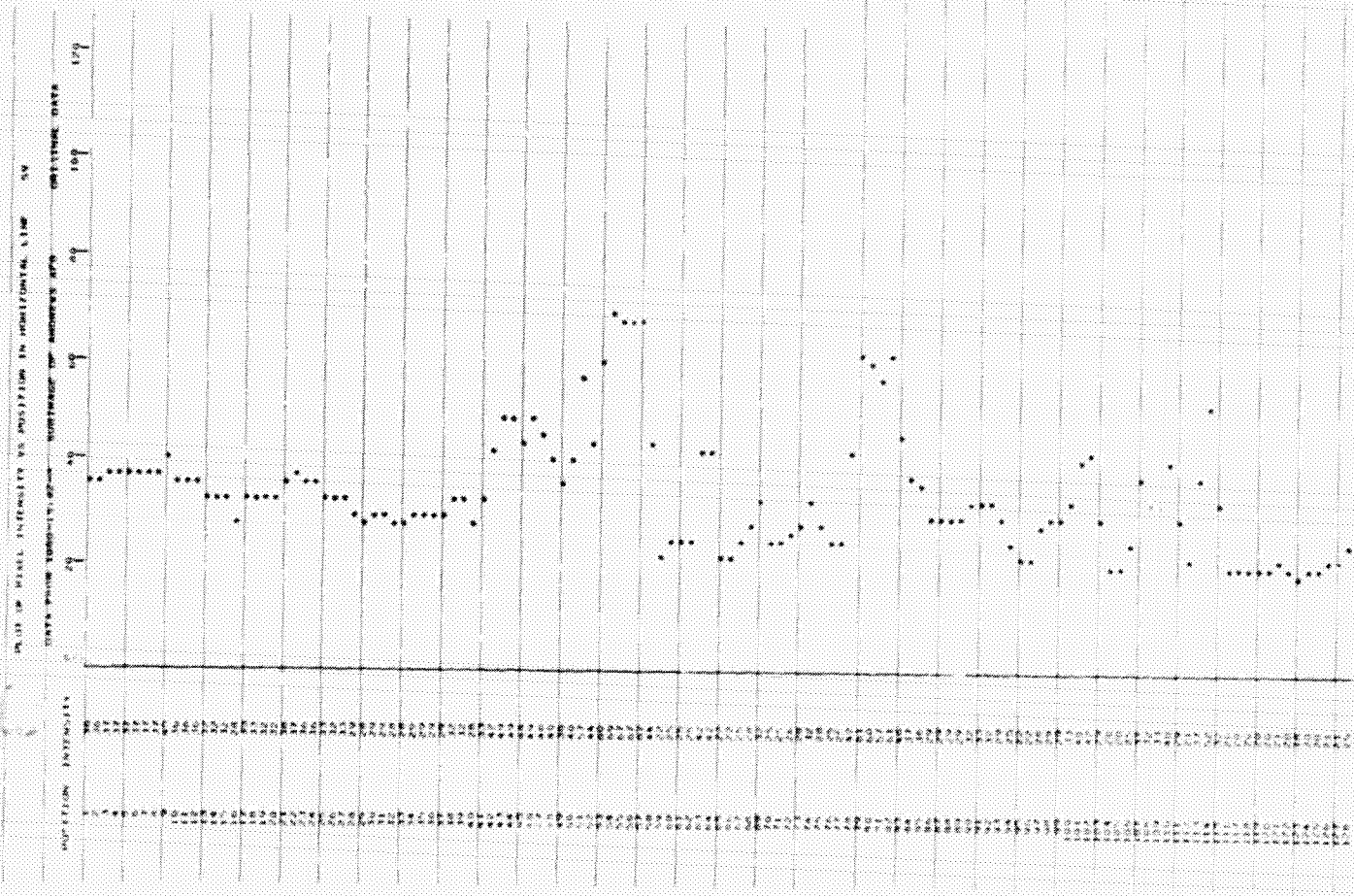


Figure 1: Intensity vs. Wavelength (nm) for the sample. The broad peak is centered at approximately 450 nm, and the sharp peak is centered at approximately 650 nm.

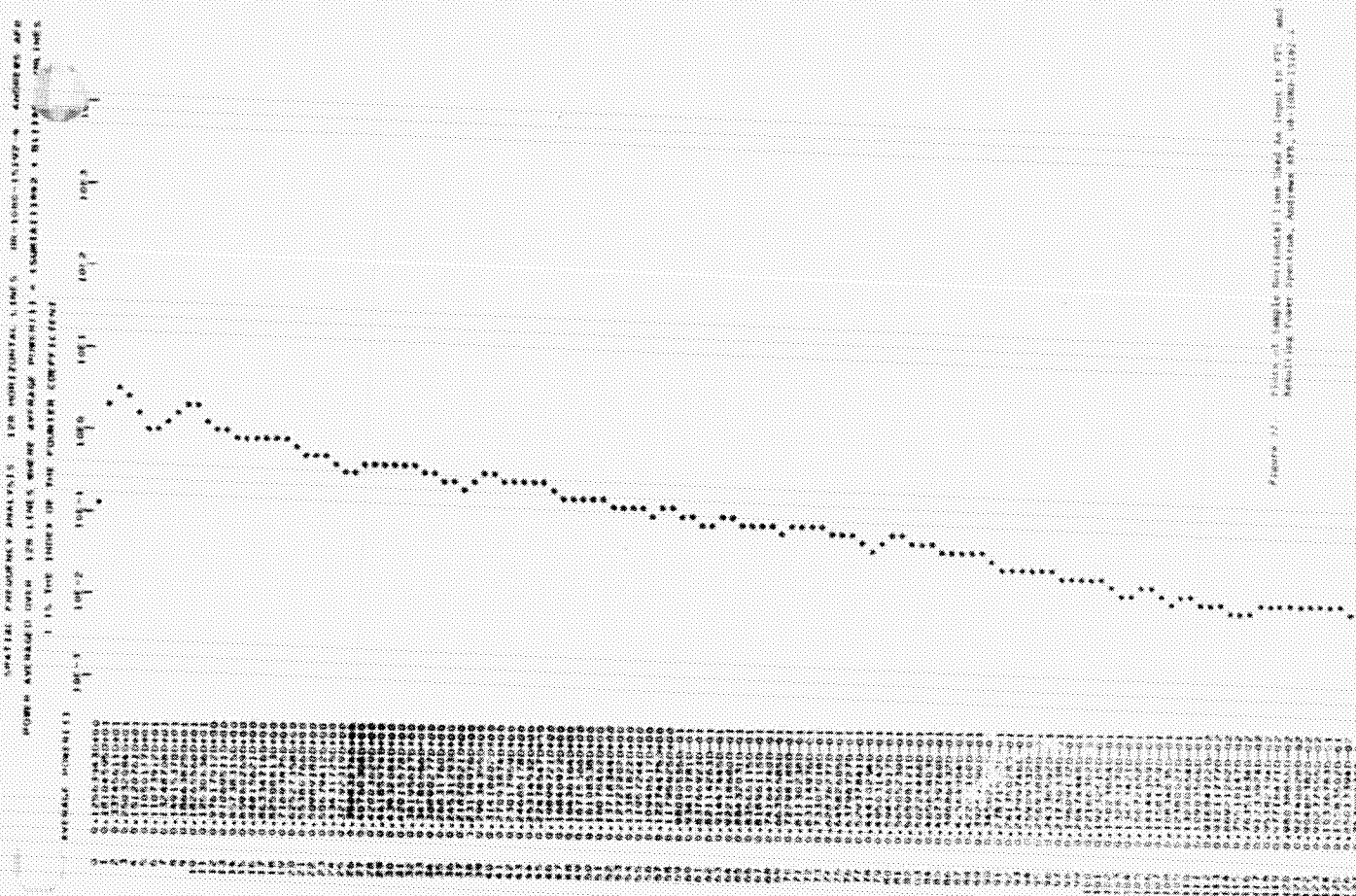


Figure 2: Intensity vs. Wavelength (nm) for the sample. The broad peak is centered at approximately 450 nm, and the sharp peak is centered at approximately 650 nm.

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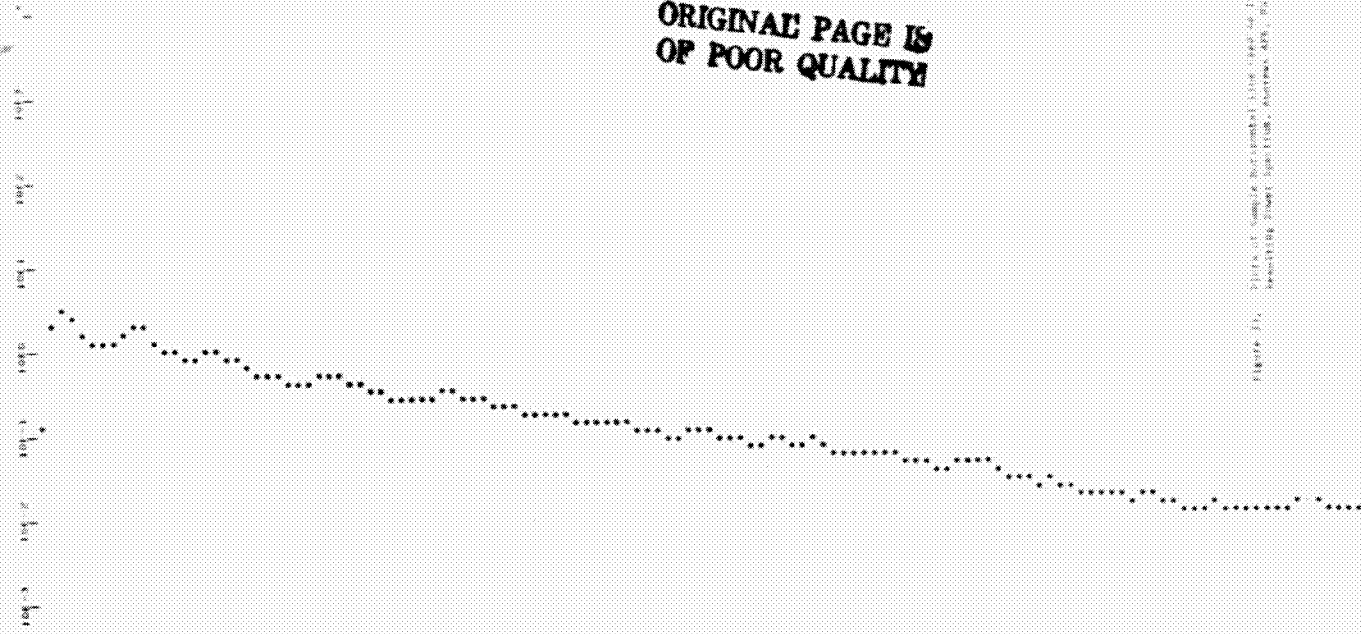


Figure 1. Relationship between spatial frequency and the number of lines per inch.

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SPATIAL FREQUENCY	NUMBER OF LINES PER INCH
10 ⁻³	10 ⁰
10 ⁻²	10 ¹
10 ⁻¹	10 ²
10 ⁰	10 ³
10 ¹	10 ⁴
10 ²	10 ⁵
10 ³	10 ⁶
10 ⁴	10 ⁷
10 ⁵	10 ⁸
10 ⁶	10 ⁹
10 ⁷	10 ¹⁰
10 ⁸	10 ¹¹
10 ⁹	10 ¹²
10 ¹⁰	10 ¹³
10 ¹¹	10 ¹⁴
10 ¹²	10 ¹⁵
10 ¹³	10 ¹⁶
10 ¹⁴	10 ¹⁷
10 ¹⁵	10 ¹⁸
10 ¹⁶	10 ¹⁹
10 ¹⁷	10 ²⁰
10 ¹⁸	10 ²¹
10 ¹⁹	10 ²²
10 ²⁰	10 ²³
10 ²¹	10 ²⁴
10 ²²	10 ²⁵
10 ²³	10 ²⁶
10 ²⁴	10 ²⁷
10 ²⁵	10 ²⁸
10 ²⁶	10 ²⁹
10 ²⁷	10 ³⁰
10 ²⁸	10 ³¹
10 ²⁹	10 ³²
10 ³⁰	10 ³³
10 ³¹	10 ³⁴
10 ³²	10 ³⁵
10 ³³	10 ³⁶
10 ³⁴	10 ³⁷
10 ³⁵	10 ³⁸
10 ³⁶	10 ³⁹
10 ³⁷	10 ⁴⁰
10 ³⁸	10 ⁴¹
10 ³⁹	10 ⁴²
10 ⁴⁰	10 ⁴³
10 ⁴¹	10 ⁴⁴
10 ⁴²	10 ⁴⁵
10 ⁴³	10 ⁴⁶
10 ⁴⁴	10 ⁴⁷
10 ⁴⁵	10 ⁴⁸
10 ⁴⁶	10 ⁴⁹
10 ⁴⁷	10 ⁵⁰
10 ⁴⁸	10 ⁵¹
10 ⁴⁹	10 ⁵²
10 ⁵⁰	10 ⁵³
10 ⁵¹	10 ⁵⁴
10 ⁵²	10 ⁵⁵
10 ⁵³	10 ⁵⁶
10 ⁵⁴	10 ⁵⁷
10 ⁵⁵	10 ⁵⁸
10 ⁵⁶	10 ⁵⁹
10 ⁵⁷	10 ⁶⁰
10 ⁵⁸	10 ⁶¹
10 ⁵⁹	10 ⁶²
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10 ⁶²	10 ⁶⁵
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10 ⁶⁴	10 ⁶⁷
10 ⁶⁵	10 ⁶⁸
10 ⁶⁶	10 ⁶⁹
10 ⁶⁷	10 ⁷⁰
10 ⁶⁸	10 ⁷¹
10 ⁶⁹	10 ⁷²
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10 ⁷¹	10 ⁷⁴
10 ⁷²	10 ⁷⁵
10 ⁷³	10 ⁷⁶
10 ⁷⁴	10 ⁷⁷
10 ⁷⁵	10 ⁷⁸
10 ⁷⁶	10 ⁷⁹
10 ⁷⁷	10 ⁸⁰
10 ⁷⁸	10 ⁸¹
10 ⁷⁹	10 ⁸²
10 ⁸⁰	10 ⁸³
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10 ⁹¹	10 ⁹⁴
10 ⁹²	10 ⁹⁵
10 ⁹³	10 ⁹⁶
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10 ⁹⁷	10 ¹⁰⁰

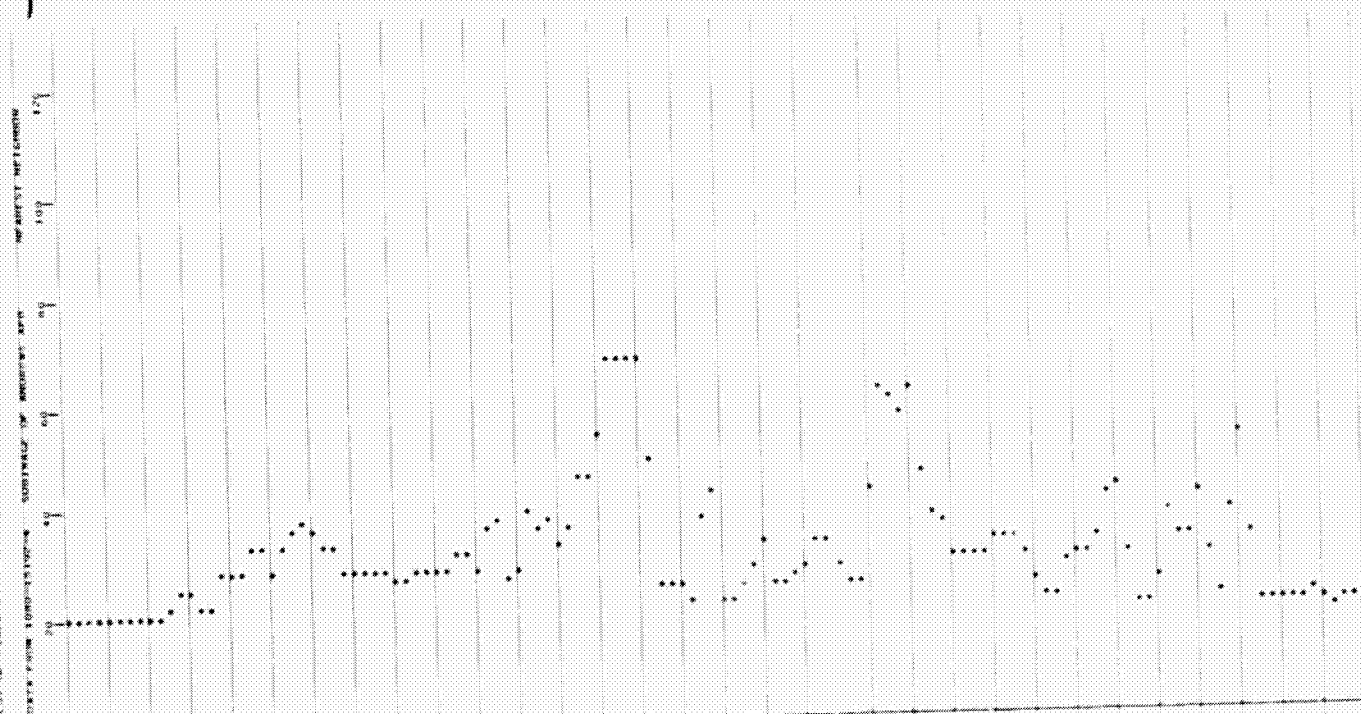


Figure 2. Relationship between spatial frequency and the number of lines per inch.

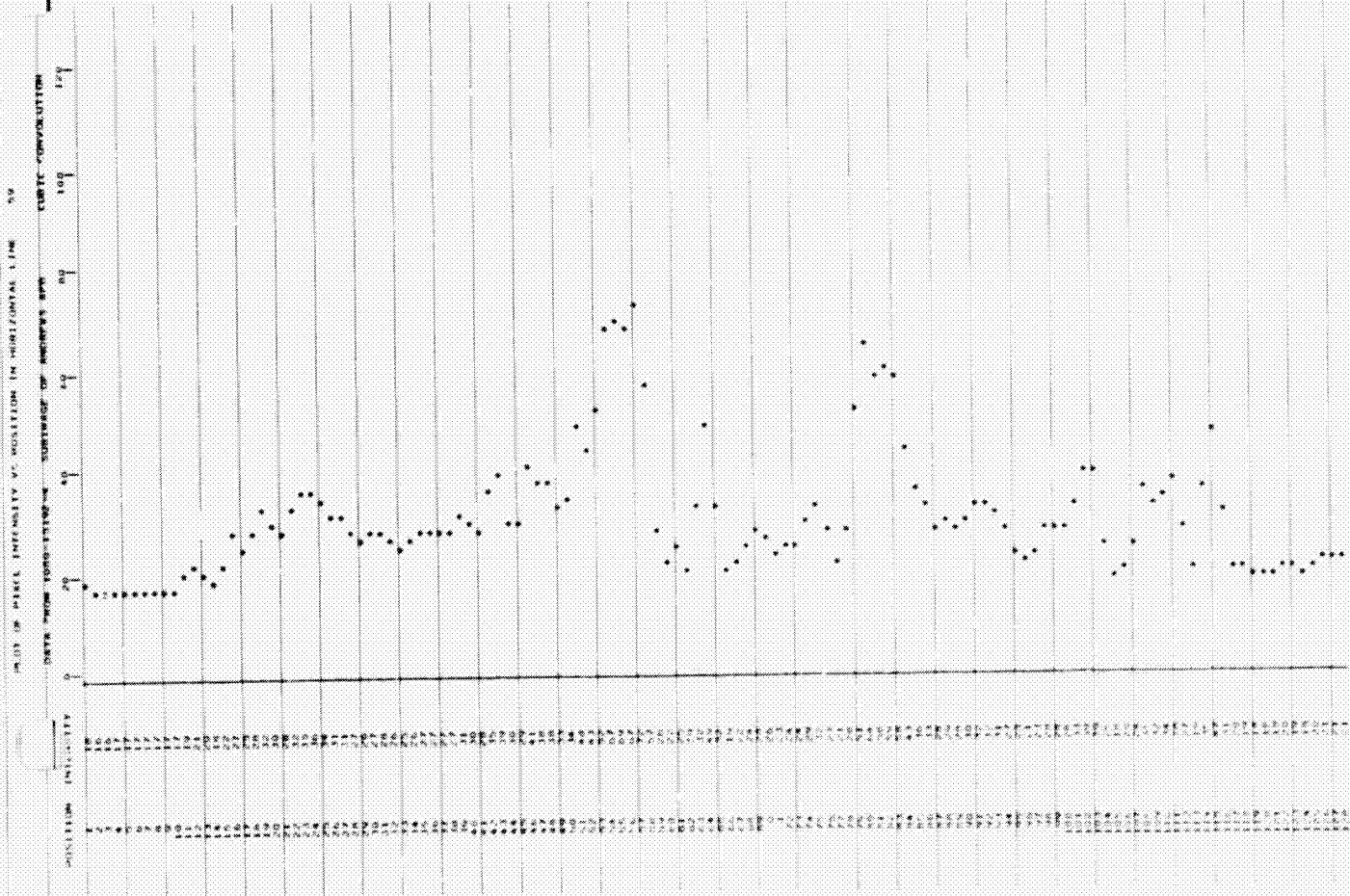
SPATIAL FREQUENCY ANALYSIS 128 HORIZONTAL LINES 10-1000-1012-4 ANDREWS AND
 POWER AVERAGED OVER 128 LINES, WHERE AVERAGE POWER IS $\sum_{i=1}^{128} |P_i|^2 / 128$

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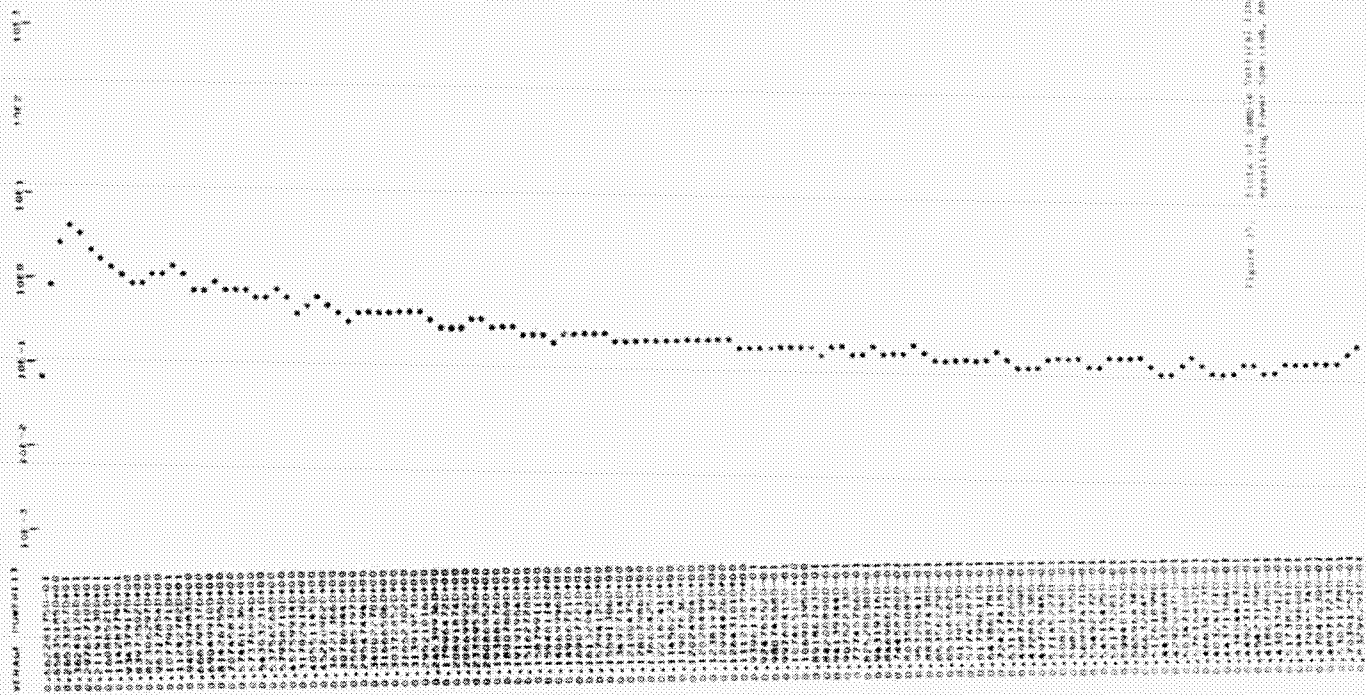


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Figure 1a. Plots of Sample Horizontal Line Load As Input to FFT, and of
 Resulting Power Spectrum, Andrews AFB, 10-1000-1012-4



END OF DATA



	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2
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SPATIAL FREQUENCY ANALYSIS 120 PERCENT LINE CC-1080-1032-4 100% APR

POWER AVERAGE OVER 120 LINES WERE AVERAGE DIFFERENCE 100% APR

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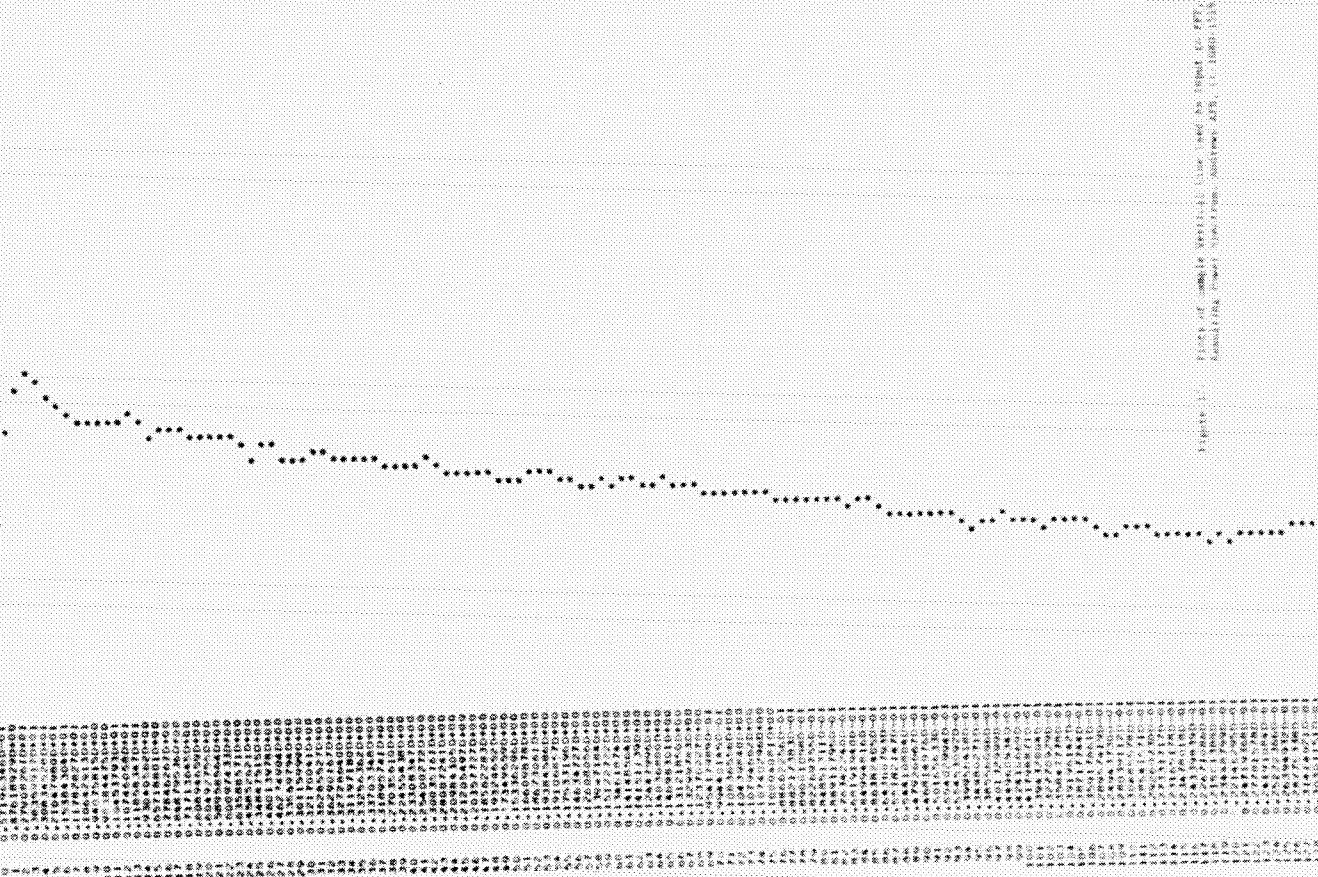


Figure 1. Plot of sample results line used to input to FFT and of sample results line used to input to FFT and of

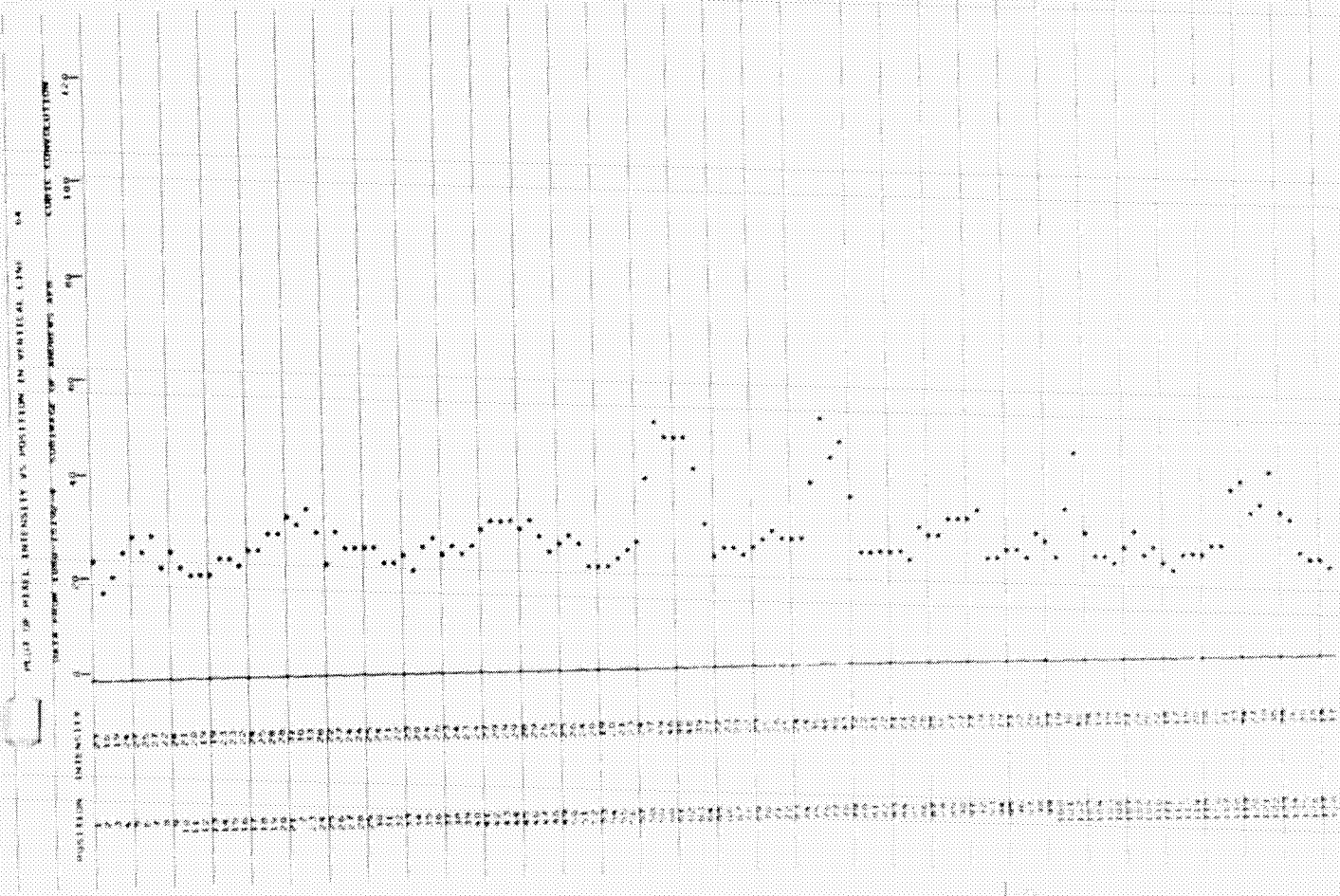


Figure 1. Plot of sample results line used to input to FFT and of sample results line used to input to FFT and of

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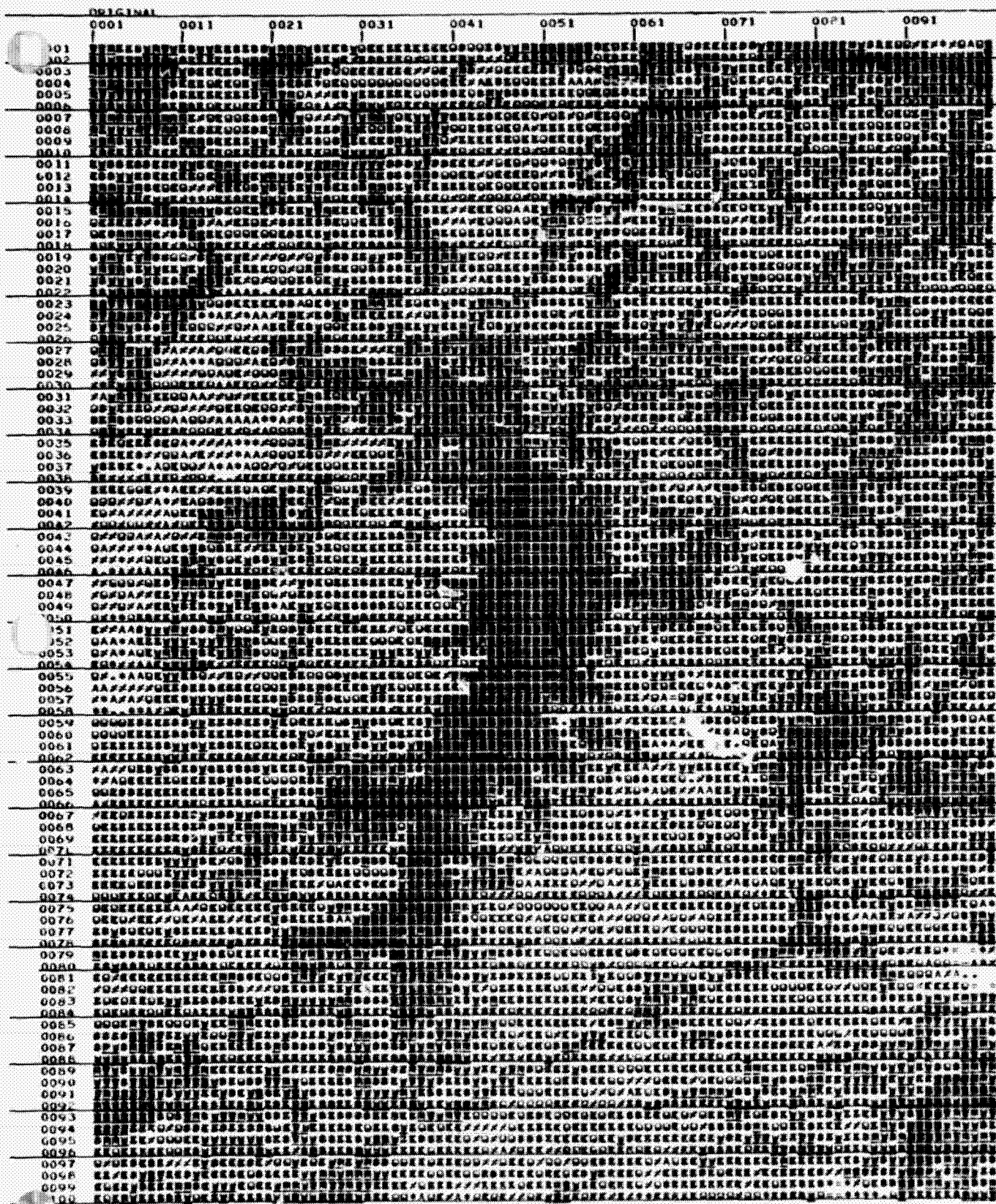


Figure 38. Shadeprint Of Lake Of The Woods, Va OR-1080-15192-2

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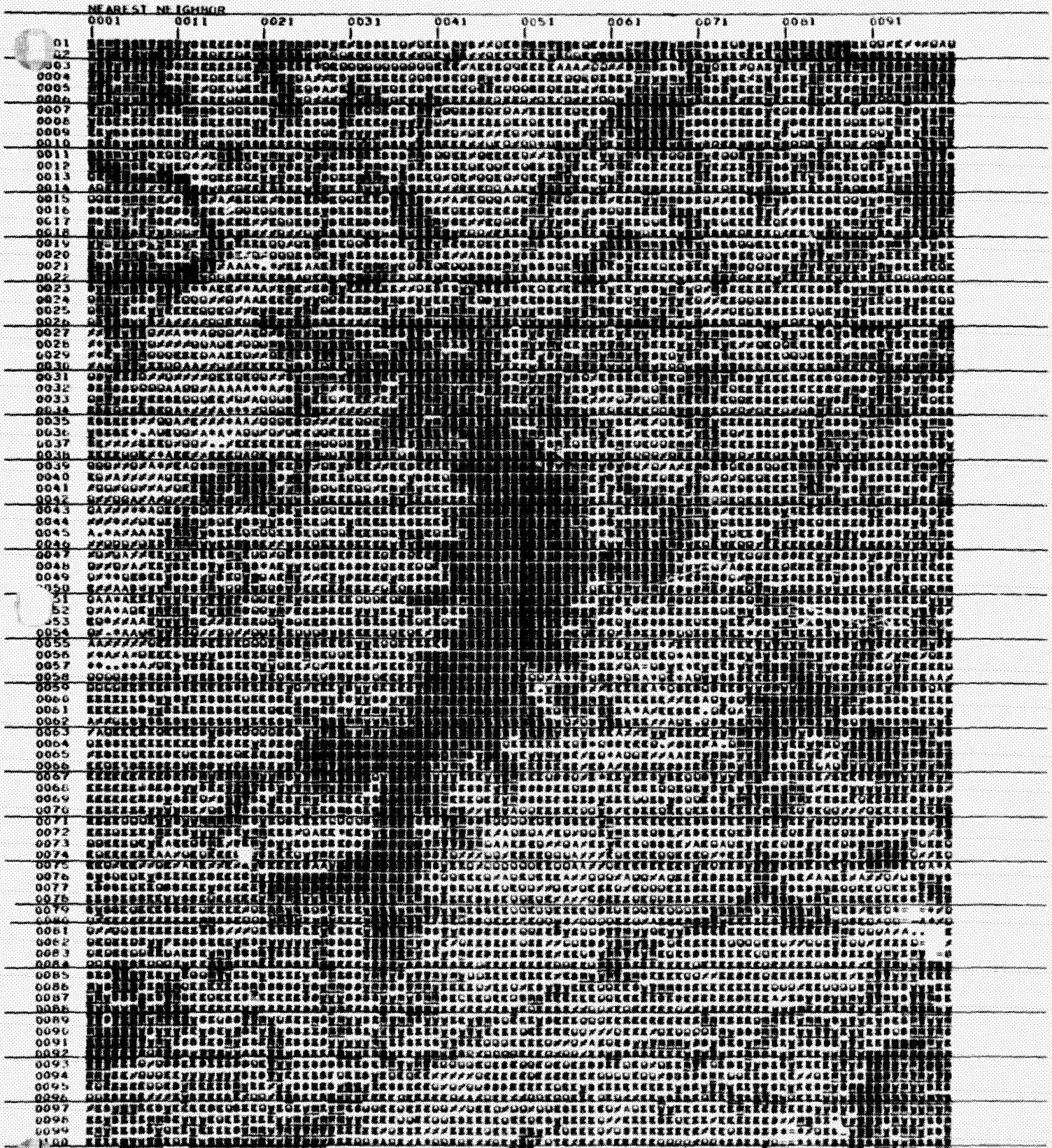


Figure 39. Shadeprint Of Lake Of The Woods, Va NN-1080-15197-7

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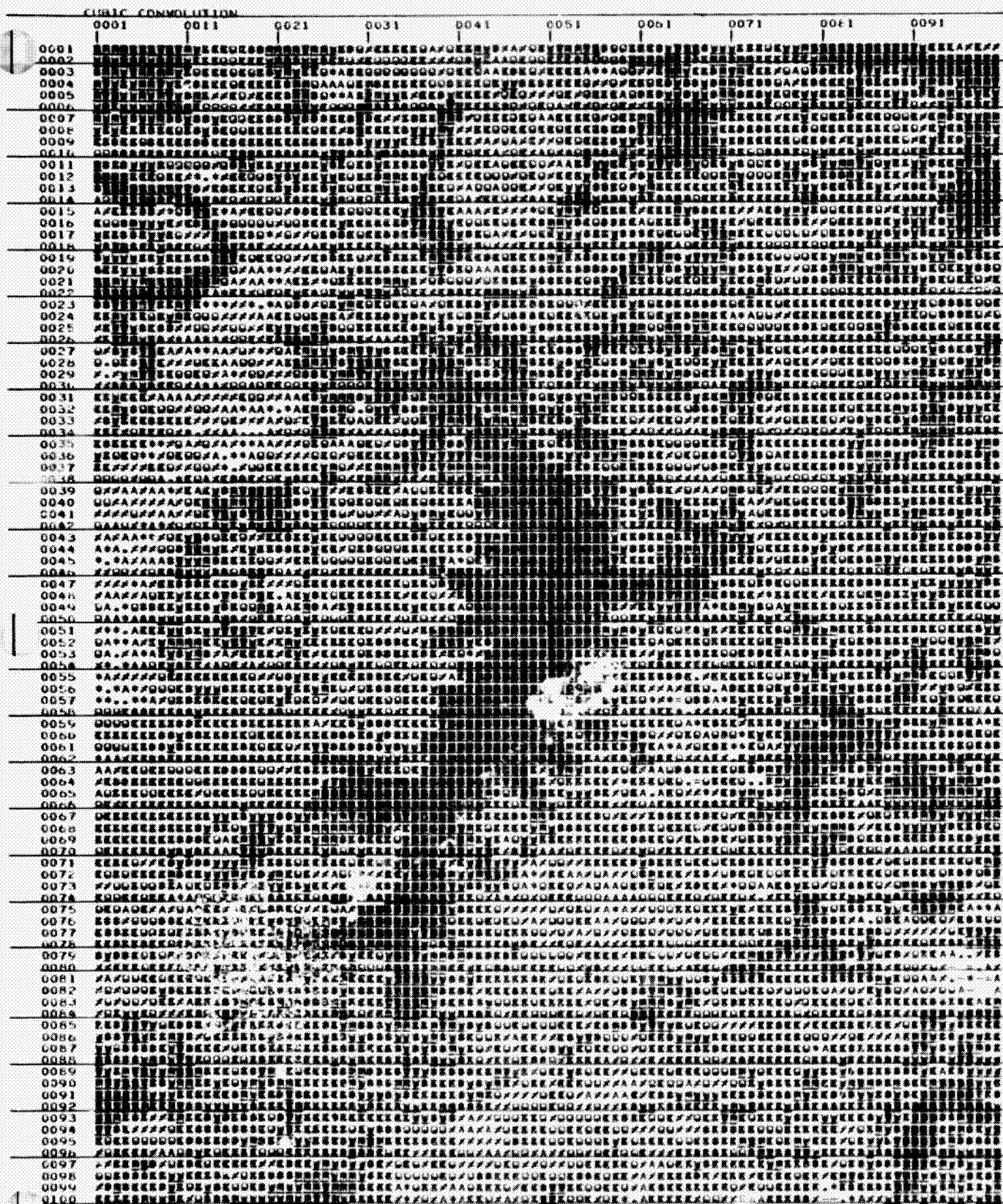


Figure 40. Shadeprint of Lake Of The Woods, Va. CC-1080-15192-1

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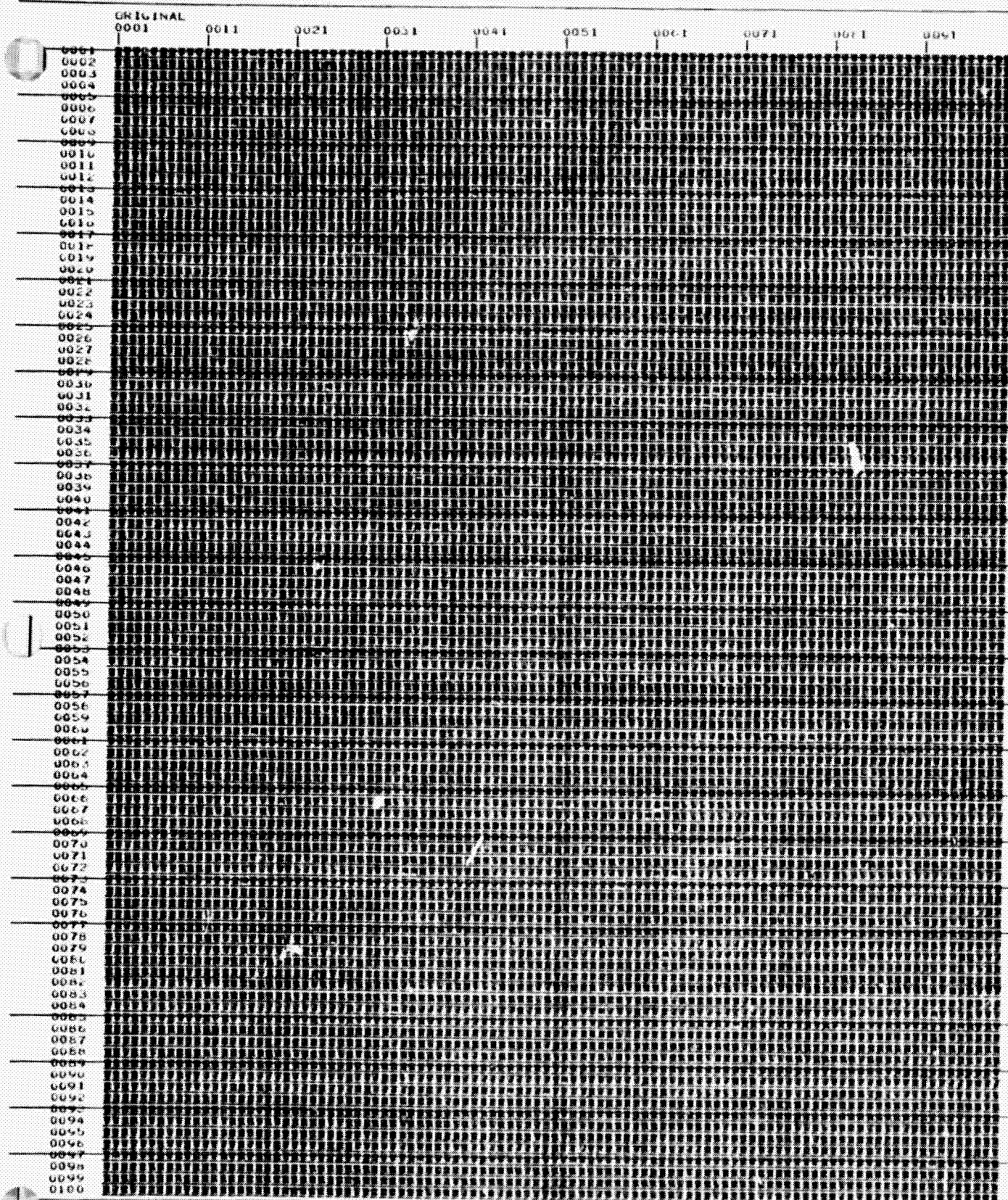


Figure 41. Shadeprint of Chesapeake Bay, Southeast Of Point
Lookout, OR-1080-15192-7

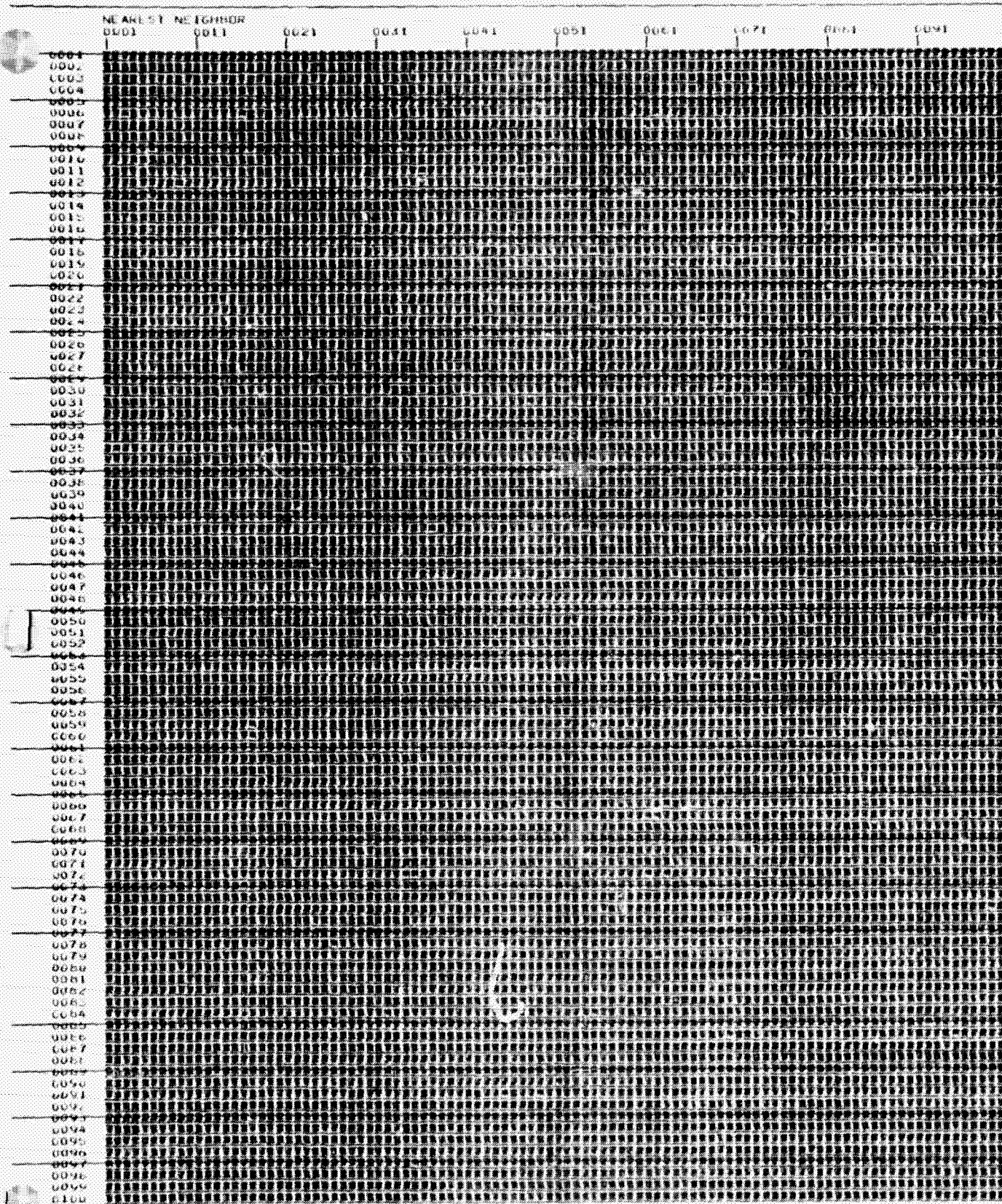


Figure 42. Shadaprint of Chesapeake Bay, Southeast of Point
Lookout; NN-1080-15192-7

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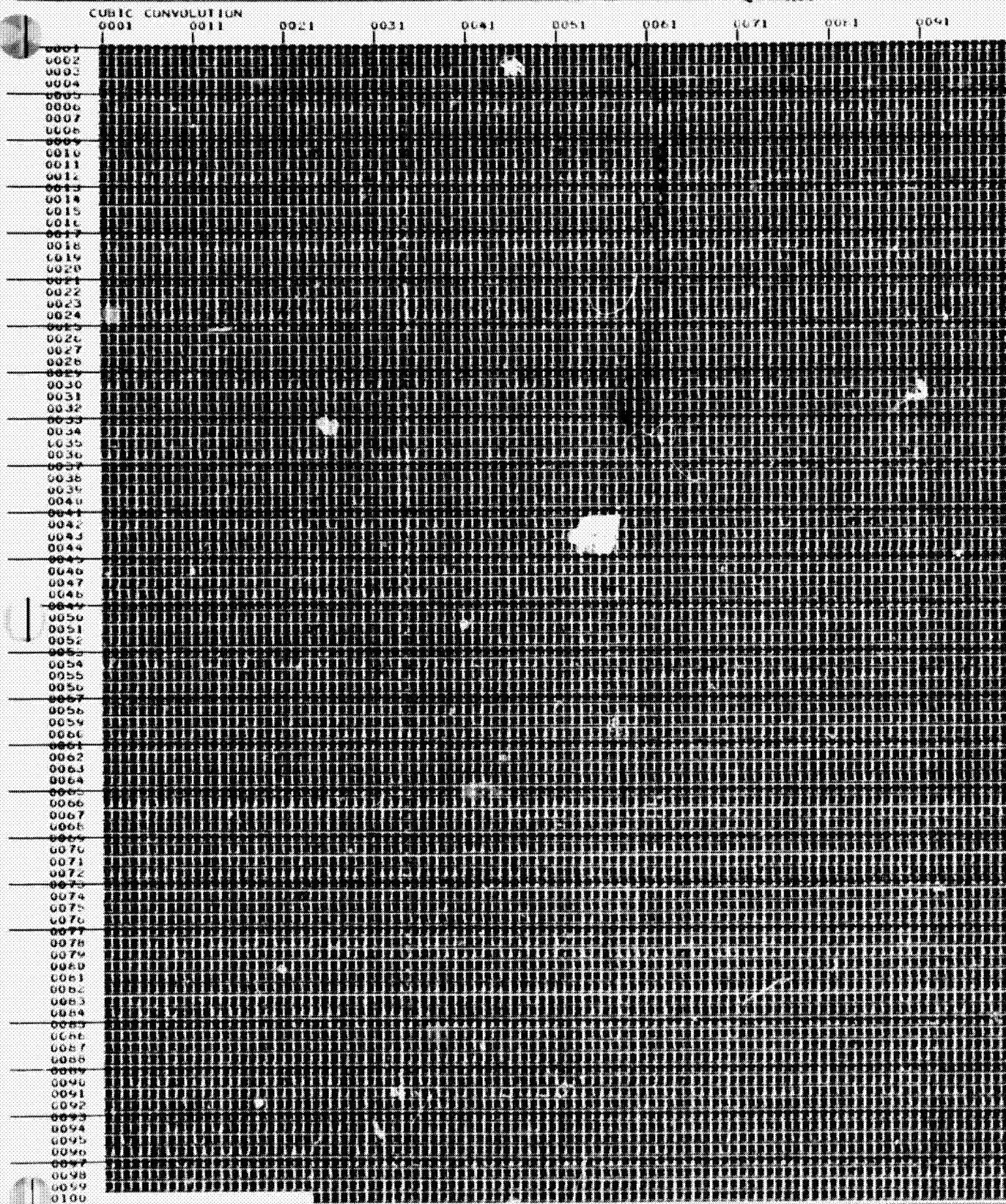


Figure 43. Shadepoint Of Chesapeake Bay, Southeast Of Point
Lookout, CC-1080-15192-7

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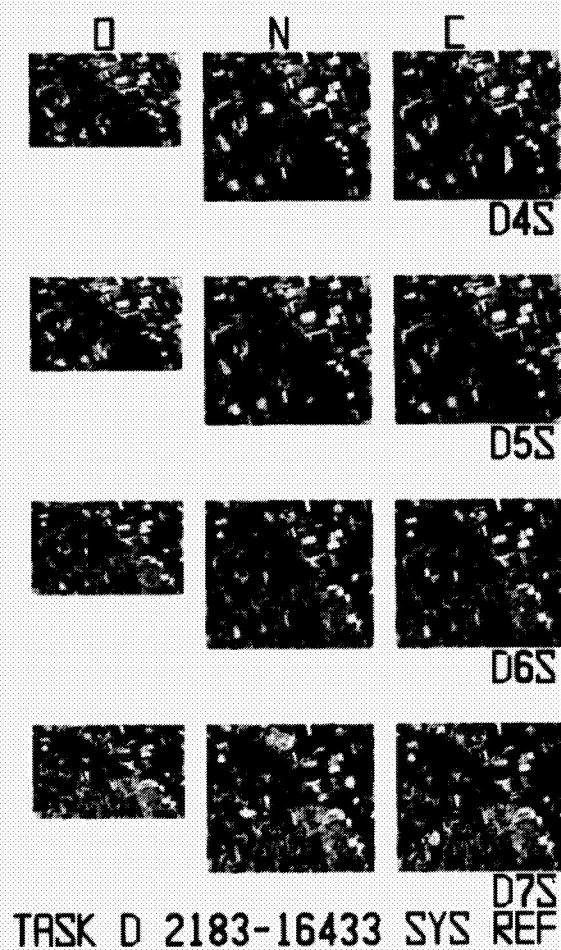


Figure 44. Contact print of LACIE intensive test site,
Hand County #2, South Dakota. Reference image
OR,NN,CC-2183-16433-4,5,6,7

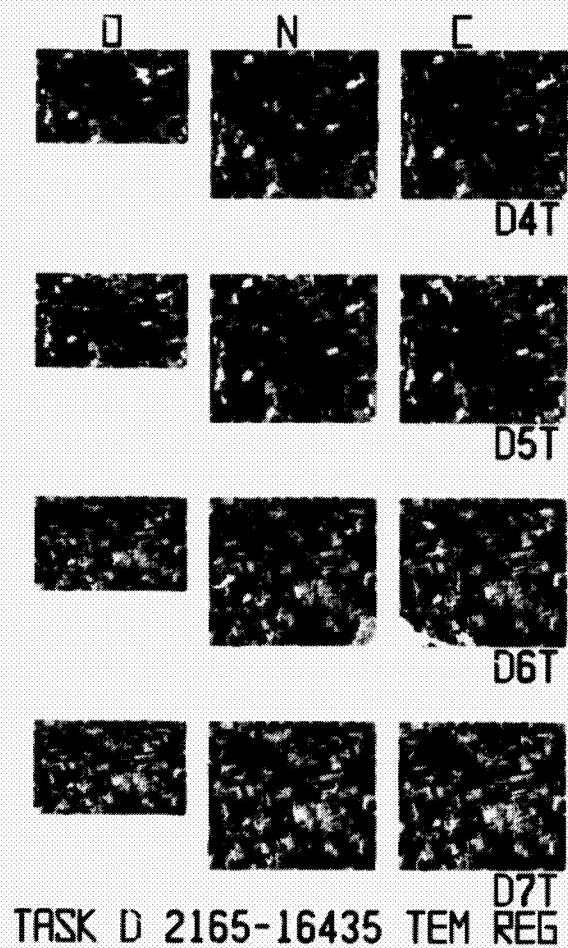


Figure 45. Contact print of LACIE intensive test site,
 Hand County #2, South Dakota. Register image
 OR,NN,CC-2165-16435-4,5,6,7



Figure 46. 10X Enlargement of LACIE Site, Reference Image OR-2183-16433-4

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Figure 47. 10X Enlargement of LACIE Site, Reference Image OR-2183-16433-5

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Figure 48. 10X Enlargement of LACIE Site, Reference Image OR-2183-16433-6



Figure 49. 10X Enlargement of LACIE Site, Reference Image OR-2183-16433-7



Figure 50. 10X Enlargement of LACIE Site, Reference Image NN-2183-16433-4

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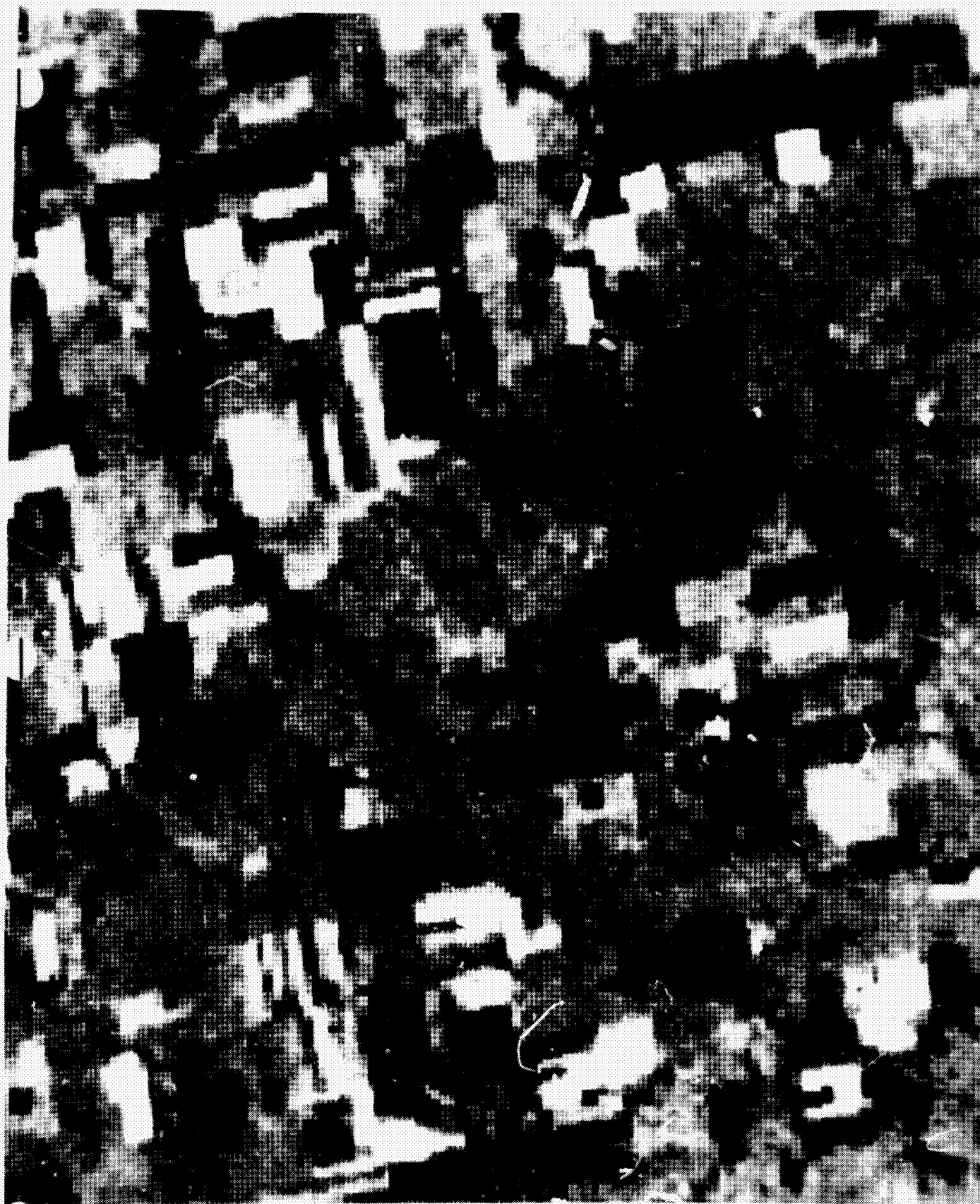


Figure 51. 10X Enlargement of LACIE Site, Reference Image NN-2183-16433-5



Figure 52. 10X Enlargement of LACIE Site, Reference Image NN-2183-16433-6

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Figure 53. 10X Enlargement of LACIE Site, Reference Image NN-2183-16433-7

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Figure 54. 10X Enlargement of LACIE Site, Reference Image CC-2183-16433-4



Figure 55. 10X Enlargement of LACIE Site, Reference Image CC-2183-16433-5



Figure 56. 10X Enlargement of LACIE Site, Reference Image CC-2183-16433-6

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Figure 57. 10X Enlargement of LACIE Site, Reference Image CC-2183-16433-7

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Figur 58. 10X Enlargement of LACIE Site, Register Image OR-2165-16435-4



Figure 59. 10X Enlargement of LACIE Site, Register Image OR-2165-16435-5

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Figure 60. 10X Enlargement of LACIE Site, Register Image OR-2165-16435-6



Figure 61. 10X Enlargement of LACIE Site, Register Image OR-2165-16435-7



Figure 62. 10X Enlargement of LACIE Site, Register Image NN-2165-16435-4

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Figure 63. 10X Enlargement of LACIE Site, Register Image NN-2165-16435-5



Figure 64. 10X Enlargement of LACIE Site, Register Image NN-2165-16435-6

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Figure 65. 10X Enlargement of LACIE Site, Register Image NN-2165-16435-7



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Figure 67. 10X Enlargement of LACIE Site, Register Image CC-2165-16435-5



Figure 68. 10X Enlargement of LACIE Site, Register Image CC-2165-16435-6
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Figure 69. 10X Enlargement of LACIE Site, Register Image CC-2165-16435-7

Image	Areal Proportion Estimates %			
	Corn	Oats	Pasture/grasses	Spring Wheat
Ground Truth Map	8.06	6.47	81.23	4.24
NN-2165-16435	12.62	10.76	64.12	12.50
CC-2165-16435	12.25	11.14	63.47	13.15
NN-2183-16433	7.47	5.62	76.08	10.83
CC-2183-16433	6.44	5.55	79.42	8.58

Figure 70. Results of the Multispectral Classification Experiment

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Figure Numbers 71-79 are not used in this report

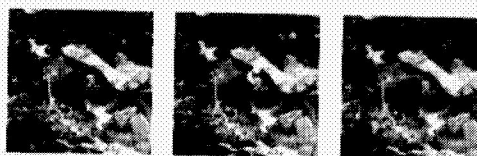
OR

NN

CC



Area 1



Area 2

Figure 80. Contact print of Area 1 and Area 2,
Monterey vicinity, Reference image
OR, NN, CC-1921-18022-5

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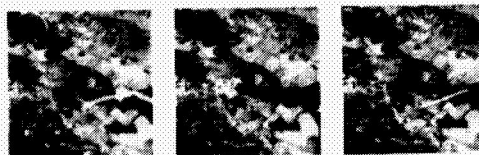
OR

NN

CC



Area 1



Area 2

Figure 81. Contact print of Area 1 and Area 2,
Monterey vicinity, Register image
OR, NN, CC-1813-18063-5

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Figure 82. 10X Enlargement of Area 1, Reference Image OR-1921-18022-5

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Figure 83. 10X Enlargement of Area 1, Reference Image NN-1921-18022-5



Figure 84. 10X Enlargement of Area 1, Reference Image CC-1921-18022-5



Figure 85. 10X Enlargement of Area 2, Reference Image OR-1921-18022-5

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Figure 86. 10X Enlargement of Area 2, Reference Image NN-1921-18022-5



Figure 87. 10X Enlargement of Area 2, Reference Image (C-1921-18022-5)

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Figure 88. 10X Enlargement of Area 1, Register Image OR-1813-18063-5



Figure 89. 10X Enlargement of Area 1, Register Image NN-1813-18063-5

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Figure 90. 10X Enlargement of Area 1, Register Image CC-1813-18063-5



Figure 91. 10X Enlargement of Area 2, Register Image OR-1813-18063-5

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Figure 92. 10X Enlargement of Area 2, Register Image NN-1813-18063-5



Figure 93. 10X Enlargement of Area 2, Register Image CC-1813-18063-5

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The image displays a highly textured, black and white surface, likely the cover or endpaper of an old book. The texture is characterized by a dense, irregular grid of dark and light pixels, creating a mottled appearance. Numerous small, light-colored spots, possibly holes or dust, are scattered across the surface. Along the left edge, there is a vertical strip of text, which appears to be a library or archival classification code. The text is partially obscured by the texture but includes the following characters: 000-1, 001-1, 002-1, 003-1, 004-1, 005-1, 006-1, 007-1, 008-1, 009-1, 010-1, 011-1, 012-1, 013-1, 014-1, 015-1, 016-1, 017-1, 018-1, 019-1, 020-1, 021-1, 022-1, 023-1, 024-1, 025-1, 026-1, 027-1, 028-1, 029-1, 030-1, 031-1, 032-1, 033-1, 034-1, 035-1, 036-1, 037-1, 038-1, 039-1, 040-1, 041-1, 042-1, 043-1, 044-1, 045-1, 046-1, 047-1, 048-1, 049-1, 050-1, 051-1, 052-1, 053-1, 054-1, 055-1, 056-1, 057-1, 058-1, 059-1, 060-1, 061-1, 062-1, 063-1, 064-1, 065-1, 066-1, 067-1, 068-1, 069-1, 070-1, 071-1, 072-1, 073-1, 074-1, 075-1, 076-1, 077-1, 078-1, 079-1, 080-1, 081-1, 082-1, 083-1, 084-1, 085-1, 086-1, 087-1, 088-1, 089-1, 090-1, 091-1, 092-1, 093-1, 094-1, 095-1, 096-1, 097-1, 098-1, 099-1, 100-1. The text is oriented vertically and is separated from the main body of the image by a thin white line.

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Figure 9a. Schematic of Area 1, Reference Image, OR-1811-1012-5

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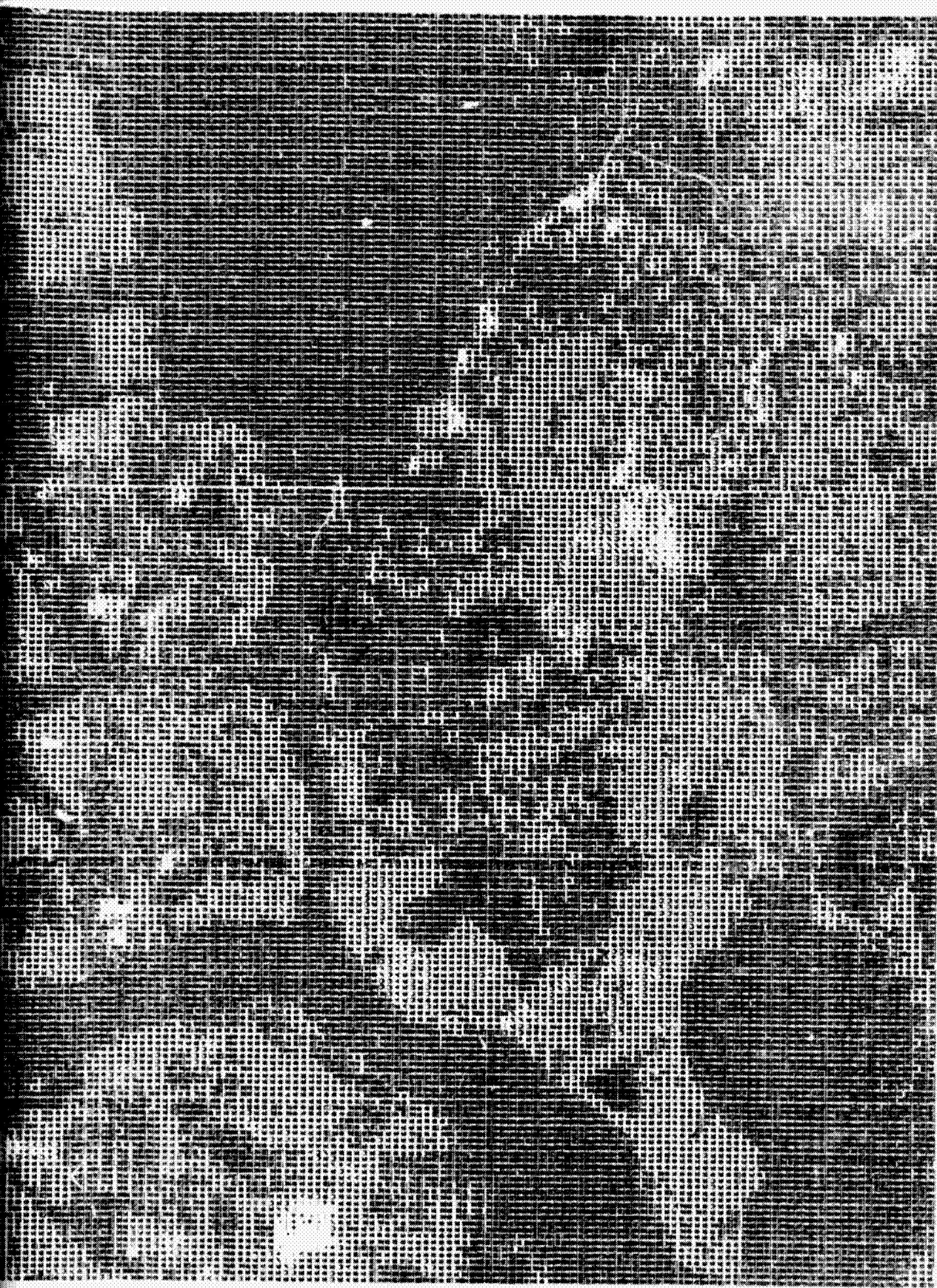


Figure 95. Summary of the data from the first two frames of the sequence.

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Figure 16. Diagram of Area 1. Reference Image, U-191-1002-5

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FOLDOUT FRAME 2

[illegible]

FOLDOUT FRAME 1

9031	9032	9033	9034	9035	9036	9037	9038	9039	9040	9041	9042	9043	9044	9045	9046	9047	9048	9049	9050	9051	9052	9053	9054	9055	9056	9057	9058	9059	9060	9061	9062	9063	9064	9065	9066	9067	9068	9069	9070	9071	9072	9073	9074	9075	9076	9077	9078	9079	9080	9081	9082	9083	9084	9085	9086	9087	9088	9089	9090	9091	9092	9093	9094	9095	9096	9097	9098	9099	9100	9101	9102	9103	9104	9105	9106	9107	9108	9109	9110	9111	9112	9113	9114	9115	9116	9117	9118	9119	9120	9121	9122	9123	9124	9125	9126	9127	9128	9129	9130	9131	9132	9133	9134	9135	9136	9137	9138	9139	9140	9141	9142	9143	9144	9145	9146	9147	9148	9149	9150	9151	9152	9153	9154	9155	9156	9157	9158	9159	9160	9161	9162	9163	9164	9165	9166	9167	9168	9169	9170	9171	9172	9173	9174	9175	9176	9177	9178	9179	9180	9181	9182	9183	9184	9185	9186	9187	9188	9189	9190	9191	9192	9193	9194	9195	9196	9197	9198	9199	9200	9201	9202	9203	9204	9205	9206	9207	9208	9209	9210	9211	9212	9213	9214	9215	9216	9217	9218	9219	9220	9221	9222	9223	9224	9225	9226	9227	9228	9229	9230	9231	9232	9233	9234	9235	9236	9237	9238	9239	9240	9241	9242	9243	9244	9245	9246	9247	9248	9249	9250	9251	9252	9253	9254	9255	9256	9257	9258	9259	9260	9261	9262	9263	9264	9265	9266	9267	9268	9269	9270	9271	9272	9273	9274	9275	9276	9277	9278	9279	9280	9281	9282	9283	9284	9285	9286	9287	9288	9289	9290	9291	9292	9293	9294	9295	9296	9297	9298	9299	9300	9301	9302	9303	9304	9305	9306	9307	9308	9309	9310	9311	9312	9313	9314	9315	9316	9317	9318	9319	9320	9321	9322	9323	9324	9325	9326	9327	9328	9329	9330	9331	9332	9333	9334	9335	9336	9337	9338	9339	9340	9341	9342	9343	9344	9345	9346	9347	9348	9349	9350	9351	9352	9353	9354	9355	9356	9357	9358	9359	9360	9361	9362	9363	9364	9365	9366	9367	9368	9369	9370	9371	9372	9373	9374	9375	9376	9377	9378	9379	9380	9381	9382	9383	9384	9385	9386	9387	9388	9389	9390	9391	9392	9393	9394	9395	9396	9397	9398	9399	9400	9401	9402	9403	9404	9405	9406	9407	9408	9409	9410	9411	9412	9413	9414	9415	9416	9417	9418	9419	9420	9421	9422	9423	9424	9425	9426	9427	9428	9429	9430	9431	9432	9433	9434	9435	9436	9437	9438	9439	9440	9441	9442	9443	9444	9445	9446	9447	9448	9449	9450	9451	9452	9453	9454	9455	9456	9457	9458	9459	9460	9461	9462	9463	9464	9465	9466	9467	9468	9469	9470	9471	9472	9473	9474	9475	9476	9477	9478	9479	9480	9481	9482	9483	9484	9485	9486	9487	9488	9489	9490	9491	9492	9493	9494	9495	9496	9497	9498	9499	9500	9501	9502	9503	9504	9505	9506	9507	9508	9509	9510	9511	9512	9513	9514	9515	9516	9517	9518	9519	9520	9521	9522	9523	9524	9525	9526	9527	9528	9529	9530	9531	9532	9533	9534	9535	9536	9537	9538	9539	9540	9541	9542	9543	9544	9545	9546	9547	9548	9549	9550	9551	9552	9553	9554	9555	9556	9557	9558	9559	9560	9561	9562	9563	9564	9565	9566	9567	9568	9569	9570	9571	9572	9573	9574	9575	9576	9577	9578	9579	9580	9581	9582	9583	9584	9585	9586	9587	9588	9589	9590	9591	9592	9593	9594	9595	9596	9597	9598	9599	9600	9601	9602	9603	9604	9605	9606	9607	9608	9609	9610	9611	9612	9613	9614	9615	9616	9617	9618	9619	9620	9621	9622	9623	9624	9625	9626	9627	9628	9629	9630	9631	9632	9633	9634	9635	9636	9637	9638	9639	9640	9641	9642	9643	9644	9645	9646	9647	9648	9649	9650	9651	9652	9653	9654	9655	9656	9657	9658	9659	9660	9661	9662	9663	9664	9665	9666	9667	9668	9669	9670	9671	9672	9673	9674	9675	9676	9677	9678	9679	9680	9681	9682	9683	9684	9685	9686	9687	9688	9689	9690	9691	9692	9693	9694	9695	9696	9697	9698	9699	9700	9701	9702	9703	9704	9705	9706	9707	9708	9709	9710	9711	9712	9713	9714	9715	9716	9717	9718	9719	9720	9721	9722	9723	9724	9725	9726	9727	9728	9729	9730	9731	9732	9733	9734	9735	9736	9737	9738	9739	9740	9741	9742	9743	9744	9745	9746	9747	9748	9749	9750	9751	9752	9753	9754	9755	9756	9757	9758	9759	9760	9761	9762	9763	9764	9765	9766	9767	9768	9769	9770	9771	9772	9773	9774	9775	9776	9777	9778	9779	9780	9781	9782	9783	9784	9785	9786	9787	9788	9789	9790	9791	9792	9793	9794	9795	9796	9797	9798	9799	9800	9801	9802	9803	9804	9805	9806	9807	9808	9809	9810	9811	9812	9813	9814	9815	9816	9817	9818	9819	9820	9821	9822	9823	9824	9825	9826	9827	9828	9829	9830	9831	9832	9833	9834	9835	9836	9837	9838	9839	9840	9841	9842	9843	9844	9845	9846	9847	9848	9849	9850	9851	9852	9853	9854	9855	9856	9857	9858	9859	9860	9861	9862	9863	9864	9865	9866	9867	9868	9869	9870	9871	9872	9873	9874	9875	9876	9877	9878	9879	9880	9881	9882	9883	9884	9885	9886	9887	9888	9889	9890	9891	9892	9893	9894	9895	9896	9897	9898	9899	9900	9901	9902	9903	9904	9905	9906	9907	9908	9909	9910	9911	9912	9913	9914	9915	9916	9917	9918	9919	9920	9921	9922	9923	9924	9925	9926	9927	9928	9929	9930	9931	9932	9933	9934	9935	9936	9937	9938	9939	9940	9941	9942	9943	9944	9945	9946	9947	9948	9949	9950	9951	9952	9953	9954	9955	9956	9957	9958	9959	9960	9961	9962	9963	9964	9965	9966	9967	9968	9969	9970	9971	9972	9973	9974	9975	9976	9977	9978	9979	9980	9981	9982	9983	9984	9985	9986	9987	9988	9989	9990	9991	9992	9993	9994	9995	9996	9997	9998	9999	10000
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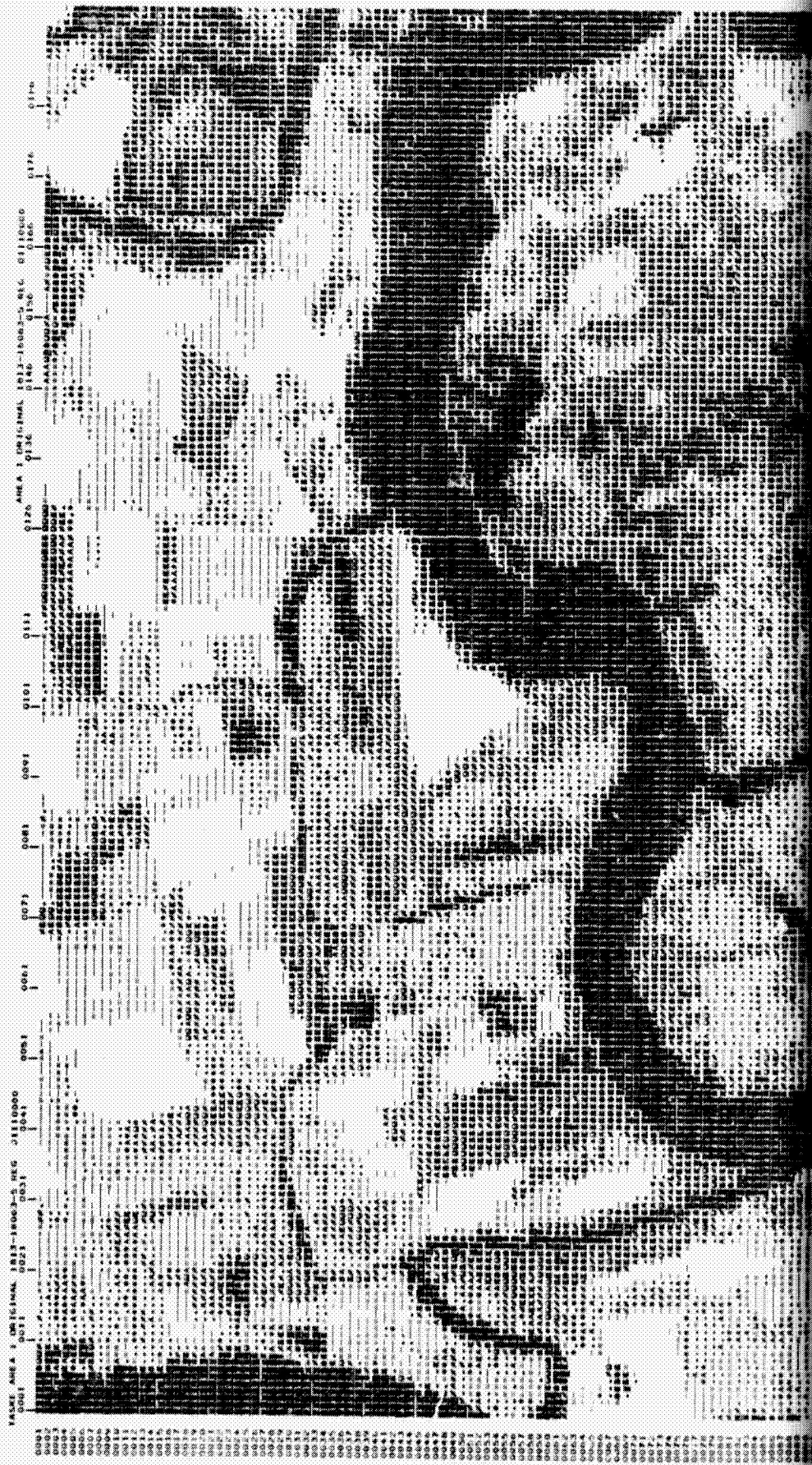
ORIGINAL PAGE IS
POOR QUALITY



Figure 99. Shadepoint of Area 2, Reference Image, GS-1023-14022-5

FOLDOUT FRAME

ORIGINAL PAGE IS
OF POOR QUALITY



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OF POOR QUALITY

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Figure 100. Shadepoint of Area 1, Register Image, (08-1813-1003-3)

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Figure 10.2. Summary of Area 1. Register Image, 80-1013-1000-1-5

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Figure 102. Shadepoint of Area 1, Register Image, CD-103-1000-5

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Figure 171. Shadedprint of Area 2, Register Image 08-183-150H3-5

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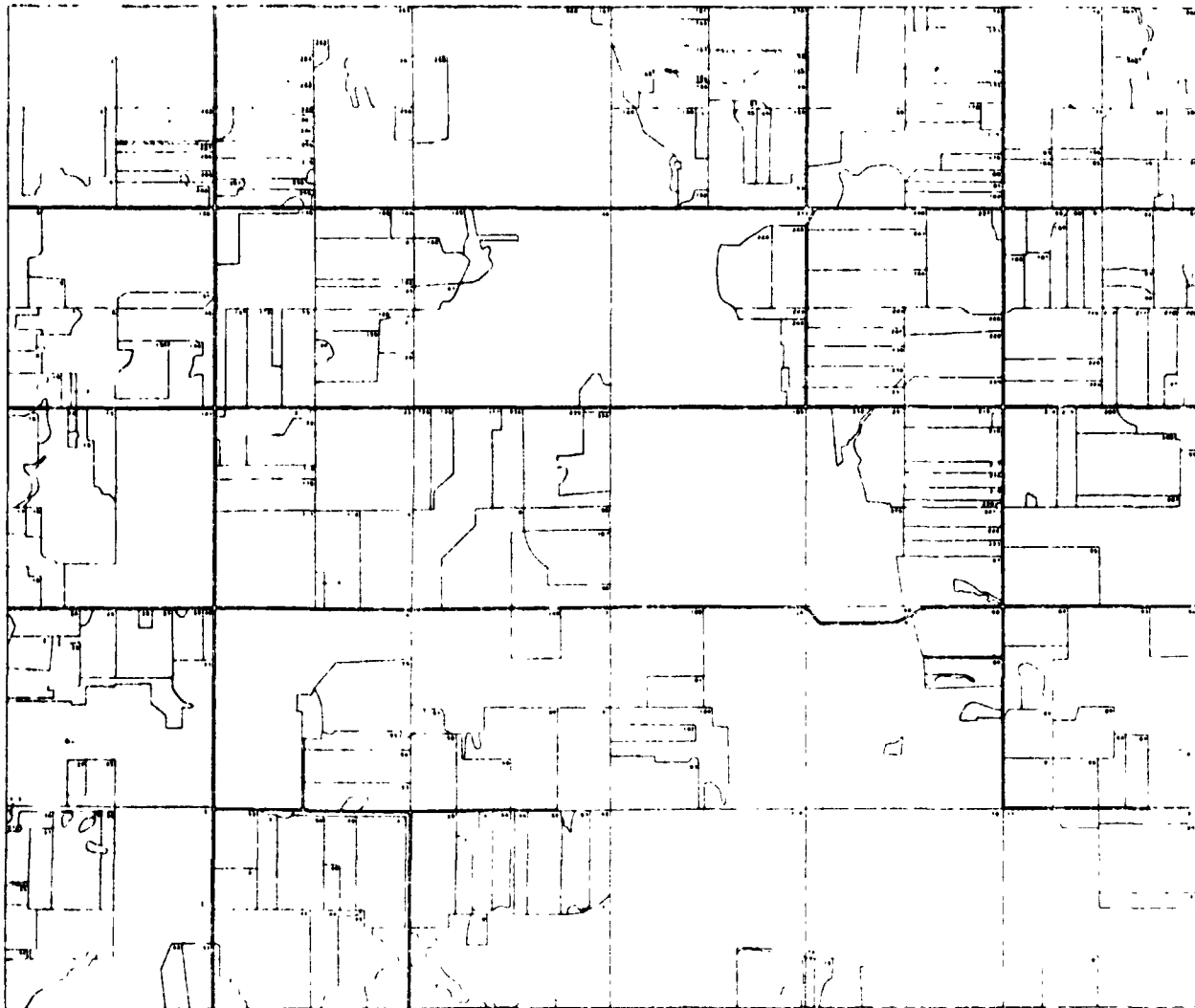
Figure 105. Photocopy of Area 2, Register image, DC-181, 100x1.5

Appendix A
Ground Truth Information
for
Hand County, South Dakota
Site 2

HAND COUNTY, SOUTH DAKOTA SITE 2

LACIE INTENSIVE STUDY SITE

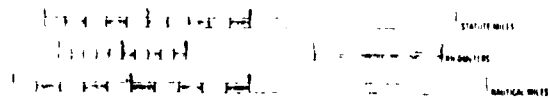
TEST SITE NO. 25 (LACIE 1976)



Photography Acquired June 1975

Approximate Scale 1:24,000

Land Use Data Collected
by The ASCS June 1975



Prepared by
FSC Cartographic Laboratory
Earth Observations Division
S & AD JSC/NASA
Houston Texas January 1976

ORIGINAL PAGE IS
OF POOR QUALITY

TEST SITE # 35 (MAY 12, 5.0.1)

DATA WFCDEC 08YR - 044
612215

10	SPRING MEAT (GEN)	211	PEPPER
201	MEAT (ST. ATTACHED)	212	CHEESE
202	MEAT (GEN)	213	CHEESE
203	MEAT (GEN)	214	CHEESE
204	MEAT (GEN)	215	CHEESE
205	MEAT (GEN)	216	CHEESE
206	MEAT (GEN)	217	CHEESE
207	MEAT (GEN)	218	CHEESE
208	MEAT (GEN)	219	CHEESE
209	MEAT (GEN)	220	CHEESE
210	MEAT (GEN)	221	CHEESE
211	MEAT (GEN)	222	CHEESE
212	MEAT (GEN)	223	CHEESE
213	MEAT (GEN)	224	CHEESE
214	MEAT (GEN)	225	CHEESE
215	MEAT (GEN)	226	CHEESE
216	MEAT (GEN)	227	CHEESE
217	MEAT (GEN)	228	CHEESE
218	MEAT (GEN)	229	CHEESE
219	MEAT (GEN)	230	CHEESE
220	MEAT (GEN)	231	CHEESE
221	MEAT (GEN)	232	CHEESE
222	MEAT (GEN)	233	CHEESE
223	MEAT (GEN)	234	CHEESE
224	MEAT (GEN)	235	CHEESE
225	MEAT (GEN)	236	CHEESE
226	MEAT (GEN)	237	CHEESE
227	MEAT (GEN)	238	CHEESE
228	MEAT (GEN)	239	CHEESE
229	MEAT (GEN)	240	CHEESE
230	MEAT (GEN)	241	CHEESE
231	MEAT (GEN)	242	CHEESE
232	MEAT (GEN)	243	CHEESE
233	MEAT (GEN)	244	CHEESE
234	MEAT (GEN)	245	CHEESE
235	MEAT (GEN)	246	CHEESE
236	MEAT (GEN)	247	CHEESE
237	MEAT (GEN)	248	CHEESE
238	MEAT (GEN)	249	CHEESE
239	MEAT (GEN)	250	CHEESE
240	MEAT (GEN)	251	CHEESE
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243	MEAT (GEN)	254	CHEESE
244	MEAT (GEN)	255	CHEESE
245	MEAT (GEN)	256	CHEESE
246	MEAT (GEN)	257	CHEESE
247	MEAT (GEN)	258	CHEESE
248	MEAT (GEN)	259	CHEESE
249	MEAT (GEN)	260	CHEESE
250	MEAT (GEN)	261	CHEESE
251	MEAT (GEN)	262	CHEESE
252	MEAT (GEN)	263	CHEESE
253	MEAT (GEN)	264	CHEESE
254	MEAT (GEN)	265	CHEESE
255	MEAT (GEN)	266	CHEESE
256	MEAT (GEN)	267	CHEESE
257	MEAT (GEN)	268	CHEESE
258	MEAT (GEN)	269	CHEESE
259	MEAT (GEN)	270	CHEESE
260	MEAT (GEN)	271	CHEESE
261	MEAT (GEN)	272	CHEESE
262	MEAT (GEN)	273	CHEESE
263	MEAT (GEN)	274	CHEESE
264	MEAT (GEN)	275	CHEESE
265	MEAT (GEN)	276	CHEESE
266	MEAT (GEN)	277	CHEESE
267	MEAT (GEN)	278	CHEESE
268	MEAT (GEN)	279	CHEESE
269	MEAT (GEN)	280	CHEESE
270	MEAT (GEN)	281	CHEESE
271	MEAT (GEN)	282	CHEESE
272	MEAT (GEN)	283	CHEESE
273	MEAT (GEN)	284	CHEESE
274	MEAT (GEN)	285	CHEESE
275	MEAT (GEN)	286	CHEESE
276	MEAT (GEN)	287	CHEESE
277	MEAT (GEN)	288	CHEESE
278	MEAT (GEN)	289	CHEESE
279	MEAT (GEN)	290	CHEESE
280	MEAT (GEN)	291	CHEESE
281	MEAT (GEN)	292	CHEESE
282	MEAT (GEN)	293	CHEESE
283	MEAT (GEN)	294	CHEESE
284	MEAT (GEN)	295	CHEESE
285	MEAT (GEN)	296	CHEESE
286	MEAT (GEN)	297	CHEESE
287	MEAT (GEN)	298	CHEESE
288	MEAT (GEN)	299	CHEESE
289	MEAT (GEN)	300	CHEESE
290	MEAT (GEN)	301	CHEESE
291	MEAT (GEN)	302	CHEESE
292	MEAT (GEN)	303	CHEESE
293	MEAT (GEN)	304	CHEESE
294	MEAT (GEN)	305	CHEESE

LAND USE CROP CIVES

[illegible]

PLANTING DATE	PLANTING DAY	PLANTING YEAR
1960	1	1960
1961	1	1961
1962	1	1962
1963	1	1963
1964	1	1964
1965	1	1965
1966	1	1966
1967	1	1967
1968	1	1968
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2018	1	2018
2019	1	2019
2020	1	2020
2021	1	2021
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IRP I C A T E D F F R V I L I Z E D

357
158
159

3.1.2.2

[illegible]

CSM:45PTS

[illegible]
$$\begin{array}{r} 100 \quad 745.8 \\ 300 \cdot 1235.3 \\ 500 \cdot 14249.1 \\ 600 \cdot 1482.8 \end{array}$$

551986

P.2
911

TEST SITE 9-35 (WASH 21), S.O.-1
INVENTORY OBSERVATION

GROUND TRUTH INVENTORY FOR

DATA RECORDED BETWEEN -8/22/75 AND -8/22/75

MAP REFERENCE # OF FIELD	ACRES	LAND USE CROP CODE	IRRIGATED	FERTILIZED	PLANTING DATE MONTH DAY YEAR	COMMENTS
100	211	SPRING WHEAT (GEN)				
200	212	WHEAT (GEN)				
201	213	WHEAT (GEN)				
202	214	WHEAT (GEN)				
203	215	WHEAT (GEN)				
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213	225	WHEAT (GEN)				
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221	233	WHEAT (GEN)				
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459	471	WHEAT (GEN)				
460	472	WHEAT (GEN)				

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TEST SITE # 35 (INVESTIG. S.O.)
INVESTIG. OBSERVATION

GROUND TRUTH INVENTORY FORM

DATA RECORDED BETWEEN - 8/26/73 AND - 8/26/73

PAP REFERENCE	ACREAGE	LAND USE	IRRIGATED	FERTILIZED	PLANTING DATE	COMMENTS
8 OF FIELD		CRP USE			MONTH DAY YEAR	
103 SPRING WHEAT (GEN)	65.1	211 PARAGON	Y	Y	- 5/17/75	422 CAPRECK
202 CATTLE PASTURE	14.2	212 MAPA	Y	Y	Byrd - 1/20	423 EAGLE SCOUT
203 CATTLE PASTURE	35.0	213 COLUMBUS	Y	Y	- 5/1/75	424 EAGLE SCOUT
204 CATTLE PASTURE	11.5	214 COLUMBUS	Y	Y	- 1/1/75	425 EAGLE SCOUT
205 CATTLE PASTURE	30.6	215 COLUMBUS	Y	Y	- 1/1/75	426 EAGLE SCOUT
206 CATTLE PASTURE	31.2	216 COLUMBUS	Y	Y	- 1/1/75	427 EAGLE SCOUT
207 CATTLE PASTURE	14.9	217 COLUMBUS	Y	Y	- 1/1/75	428 EAGLE SCOUT
208 CATTLE PASTURE	51.2	218 COLUMBUS	Y	Y	- 1/1/75	429 EAGLE SCOUT
209 CATTLE PASTURE	85.6	219 COLUMBUS	Y	Y	- 1/1/75	430 EAGLE SCOUT
210 CATTLE PASTURE	53.3	220 COLUMBUS	Y	Y	- 1/1/75	431 EAGLE SCOUT
211 CATTLE PASTURE	11.2	221 COLUMBUS	Y	Y	- 1/1/75	432 EAGLE SCOUT
212 CATTLE PASTURE	5.0	222 COLUMBUS	Y	Y	- 1/1/75	433 EAGLE SCOUT
213 CATTLE PASTURE	8.4	223 COLUMBUS	Y	Y	- 1/1/75	434 EAGLE SCOUT
214 CATTLE PASTURE	32.2	224 COLUMBUS	Y	Y	- 1/1/75	435 EAGLE SCOUT
215 CATTLE PASTURE	24.0	225 COLUMBUS	Y	Y	- 1/1/75	436 EAGLE SCOUT
216 CATTLE PASTURE	12.9	226 COLUMBUS	Y	Y	- 1/1/75	437 EAGLE SCOUT
217 CATTLE PASTURE	3.7	227 COLUMBUS	Y	Y	- 1/1/75	438 EAGLE SCOUT
218 CATTLE PASTURE	38.2	228 COLUMBUS	Y	Y	- 1/1/75	439 EAGLE SCOUT
219 CATTLE PASTURE	33.2	229 COLUMBUS	Y	Y	- 1/1/75	440 EAGLE SCOUT
220 CATTLE PASTURE	11.5	230 COLUMBUS	Y	Y	- 1/1/75	441 EAGLE SCOUT
221 CATTLE PASTURE	16.6	231 COLUMBUS	Y	Y	- 1/1/75	442 EAGLE SCOUT
222 CATTLE PASTURE	39.5	232 COLUMBUS	Y	Y	- 1/1/75	443 EAGLE SCOUT
223 CATTLE PASTURE	32.2	233 COLUMBUS	Y	Y	- 1/1/75	444 EAGLE SCOUT
224 CATTLE PASTURE	21.4	234 COLUMBUS	Y	Y	- 1/1/75	445 EAGLE SCOUT
225 CATTLE PASTURE	22.4	235 COLUMBUS	Y	Y	- 1/1/75	446 EAGLE SCOUT
226 CATTLE PASTURE	4.0	236 COLUMBUS	Y	Y	- 1/1/75	447 EAGLE SCOUT
227 CATTLE PASTURE	5.5	237 COLUMBUS	Y	Y	- 1/1/75	448 EAGLE SCOUT
228 CATTLE PASTURE	10.0	238 COLUMBUS	Y	Y	- 1/1/75	449 EAGLE SCOUT
229 CATTLE PASTURE	5.5	239 COLUMBUS	Y	Y	- 1/1/75	450 EAGLE SCOUT
230 CATTLE PASTURE	10.0	240 COLUMBUS	Y	Y	- 1/1/75	451 EAGLE SCOUT

141	65.1	211 PARAGON	Y	Y	- 5/17/75	422 CAPRECK
142	14.2	212 MAPA	Y	Y	Byrd - 1/20	423 EAGLE SCOUT
143	35.0	213 COLUMBUS	Y	Y	- 5/1/75	424 EAGLE SCOUT
144	11.5	214 COLUMBUS	Y	Y	- 1/1/75	425 EAGLE SCOUT
145	30.6	215 COLUMBUS	Y	Y	- 1/1/75	426 EAGLE SCOUT
146	31.2	216 COLUMBUS	Y	Y	- 1/1/75	427 EAGLE SCOUT
147	14.9	217 COLUMBUS	Y	Y	- 1/1/75	428 EAGLE SCOUT
148	51.2	218 COLUMBUS	Y	Y	- 1/1/75	429 EAGLE SCOUT
149	85.6	219 COLUMBUS	Y	Y	- 1/1/75	430 EAGLE SCOUT
150	53.3	220 COLUMBUS	Y	Y	- 1/1/75	431 EAGLE SCOUT
151	11.2	221 COLUMBUS	Y	Y	- 1/1/75	432 EAGLE SCOUT
152	5.0	222 COLUMBUS	Y	Y	- 1/1/75	433 EAGLE SCOUT
153	8.4	223 COLUMBUS	Y	Y	- 1/1/75	434 EAGLE SCOUT
154	32.2	224 COLUMBUS	Y	Y	- 1/1/75	435 EAGLE SCOUT
155	24.0	225 COLUMBUS	Y	Y	- 1/1/75	436 EAGLE SCOUT
156	12.9	226 COLUMBUS	Y	Y	- 1/1/75	437 EAGLE SCOUT
157	3.7	227 COLUMBUS	Y	Y	- 1/1/75	438 EAGLE SCOUT
158	38.2	228 COLUMBUS	Y	Y	- 1/1/75	439 EAGLE SCOUT
159	33.2	229 COLUMBUS	Y	Y	- 1/1/75	440 EAGLE SCOUT
160	11.5	230 COLUMBUS	Y	Y	- 1/1/75	441 EAGLE SCOUT
161	16.6	231 COLUMBUS	Y	Y	- 1/1/75	442 EAGLE SCOUT
162	39.5	232 COLUMBUS	Y	Y	- 1/1/75	443 EAGLE SCOUT
163	32.2	233 COLUMBUS	Y	Y	- 1/1/75	444 EAGLE SCOUT
164	21.4	234 COLUMBUS	Y	Y	- 1/1/75	445 EAGLE SCOUT
165	22.4	235 COLUMBUS	Y	Y	- 1/1/75	446 EAGLE SCOUT
166	4.0	236 COLUMBUS	Y	Y	- 1/1/75	447 EAGLE SCOUT
167	5.5	237 COLUMBUS	Y	Y	- 1/1/75	448 EAGLE SCOUT
168	10.0	238 COLUMBUS	Y	Y	- 1/1/75	449 EAGLE SCOUT

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TEST SITE # 25 (INVEST.) S.O.S.
INVENTORY OBSERVATION

GROUND TRUTH INVENTORY P.C.M

DATA RECORDED BETWEEN - 8/22/75 AND - 8/22/75

P:8
811

PLOT REFERENCE # OF FIELD	ACREAGE	LAND USE	IRRIGATED	FERTILIZED	PLANTING DATE MONTH DAY YEAR	COMMENTS	LAND USE CROP CODES											
							100	101	102	103	104	105	106	107	108	109	110	111
197	42.2	211 PASTURE			5/21/75													
198	52.2	212 PASTURE			5/21/75													
199	27.4	213 PASTURE			5/21/75													
200	25.2	214 PASTURE			5/21/75													
201	27.5	215 PASTURE			5/21/75													
202	23.3	216 PASTURE			5/21/75													
203	37.4	217 PASTURE			5/21/75													
204	59.4	218 PASTURE			5/21/75													
205	41.6	219 PASTURE			5/21/75													
206	28.3	220 PASTURE			5/21/75													
207	20.7	221 PASTURE			5/21/75													
208	102.2	222 PASTURE			5/21/75													
209	21.5	223 PASTURE			5/21/75													
210	41.7	224 PASTURE			5/21/75													
211	42.7	225 PASTURE			5/21/75													
212	25.5	226 PASTURE			5/21/75													
213	29.0	227 PASTURE			5/21/75													
214	51.4	228 PASTURE			5/21/75													
215	27.3	229 PASTURE			5/21/75													
216	49.1	230 PASTURE			5/21/75													
217	18.1	231 PASTURE			5/21/75													
218	27.6	232 PASTURE			5/21/75													
219	19.5	233 PASTURE			5/21/75													
220	11.4	234 PASTURE			5/21/75													
221	32.3	235 PASTURE			5/21/75													
222	19.7	236 PASTURE			5/21/75													
223	24.6	237 PASTURE			5/21/75													
224	40.0	238 PASTURE			5/21/75													

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TEST SITE # 35 (UNCLASSIFIED) S.O. 1
INVENTORY INSTRUCTIONS

GROUND TRUTH INVENTORY FORM

DATA RECORDED BETWEEN AND = 6/26/15

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Q. 11

MAP REFERENCE # OF FIELD	ACRES	LAND USE	IRRIGATED	FERTILIZED	PLANTING DATE MONTH DAY YEAR	COMMENTS
197 SPRING WHEAT (GEN)	211	BARBACH	Y	Y	5/22/75	
198 SPRING WHEAT (GEN)	212	WHEAT	Y	Y	5/22/75	
199 SPRING WHEAT (GEN)	213	WHEAT	Y	Y	5/22/75	
200 SPRING WHEAT (GEN)	214	WHEAT	Y	Y	5/22/75	
201 SPRING WHEAT (GEN)	215	WHEAT	Y	Y	5/22/75	
202 SPRING WHEAT (GEN)	216	WHEAT	Y	Y	5/22/75	
203 SPRING WHEAT (GEN)	217	WHEAT	Y	Y	5/22/75	
204 SPRING WHEAT (GEN)	218	WHEAT	Y	Y	5/22/75	
205 SPRING WHEAT (GEN)	219	WHEAT	Y	Y	5/22/75	
206 SPRING WHEAT (GEN)	220	WHEAT	Y	Y	5/22/75	
207 SPRING WHEAT (GEN)	221	WHEAT	Y	Y	5/22/75	
208 SPRING WHEAT (GEN)	222	WHEAT	Y	Y	5/22/75	
209 SPRING WHEAT (GEN)	223	WHEAT	Y	Y	5/22/75	
210 SPRING WHEAT (GEN)	224	WHEAT	Y	Y	5/22/75	
211 SPRING WHEAT (GEN)	225	WHEAT	Y	Y	5/22/75	
212 SPRING WHEAT (GEN)	226	WHEAT	Y	Y	5/22/75	
213 SPRING WHEAT (GEN)	227	WHEAT	Y	Y	5/22/75	
214 SPRING WHEAT (GEN)	228	WHEAT	Y	Y	5/22/75	
215 SPRING WHEAT (GEN)	229	WHEAT	Y	Y	5/22/75	
216 SPRING WHEAT (GEN)	230	WHEAT	Y	Y	5/22/75	
217 SPRING WHEAT (GEN)	231	WHEAT	Y	Y	5/22/75	
218 SPRING WHEAT (GEN)	232	WHEAT	Y	Y	5/22/75	
219 SPRING WHEAT (GEN)	233	WHEAT	Y	Y	5/22/75	
220 SPRING WHEAT (GEN)	234	WHEAT	Y	Y	5/22/75	
221 SPRING WHEAT (GEN)	235	WHEAT	Y	Y	5/22/75	
222 SPRING WHEAT (GEN)	236	WHEAT	Y	Y	5/22/75	
223 SPRING WHEAT (GEN)	237	WHEAT	Y	Y	5/22/75	
224 SPRING WHEAT (GEN)	238	WHEAT	Y	Y	5/22/75	
225 SPRING WHEAT (GEN)	239	WHEAT	Y	Y	5/22/75	
226 SPRING WHEAT (GEN)	240	WHEAT	Y	Y	5/22/75	
227 SPRING WHEAT (GEN)	241	WHEAT	Y	Y	5/22/75	
228 SPRING WHEAT (GEN)	242	WHEAT	Y	Y	5/22/75	
229 SPRING WHEAT (GEN)	243	WHEAT	Y	Y	5/22/75	
230 SPRING WHEAT (GEN)	244	WHEAT	Y	Y	5/22/75	
231 SPRING WHEAT (GEN)	245	WHEAT	Y	Y	5/22/75	
232 SPRING WHEAT (GEN)	246	WHEAT	Y	Y	5/22/75	
233 SPRING WHEAT (GEN)	247	WHEAT	Y	Y	5/22/75	
234 SPRING WHEAT (GEN)	248	WHEAT	Y	Y	5/22/75	
235 SPRING WHEAT (GEN)	249	WHEAT	Y	Y	5/22/75	
236 SPRING WHEAT (GEN)	250	WHEAT	Y	Y	5/22/75	
237 SPRING WHEAT (GEN)	251	WHEAT	Y	Y	5/22/75	
238 SPRING WHEAT (GEN)	252	WHEAT	Y	Y	5/22/75	

MAP REFERENCE # OF FIELD	ACRES	LAND USE	IRRIGATED	FERTILIZED	PLANTING DATE MONTH DAY YEAR	COMMENTS
225	22.6	WHEAT	Y	Y	5/22/75	
226	28.0	WHEAT	Y	Y	5/22/75	
227	17.6	WHEAT	Y	Y	5/22/75	
228	34.4	WHEAT	Y	Y	5/22/75	
229	72.8	WHEAT	Y	Y	5/22/75	
230	44.1	WHEAT	Y	Y	5/22/75	
231	66.5	WHEAT	Y	Y	5/22/75	
232	16.3	WHEAT	Y	Y	5/22/75	
233	476.9	WHEAT	Y	Y	5/22/75	
234	43.2	WHEAT	Y	Y	5/22/75	
235	92.2	WHEAT	Y	Y	5/22/75	
236	47.5	WHEAT	Y	Y	5/22/75	
237	298.2	WHEAT	Y	Y	5/22/75	
238	31.9	WHEAT	Y	Y	5/22/75	
239	30.3	WHEAT	Y	Y	5/22/75	
240	22.9	WHEAT	Y	Y	5/22/75	
241	30.5	WHEAT	Y	Y	5/22/75	
242	23.1	WHEAT	Y	Y	5/22/75	
243	12.1	WHEAT	Y	Y	5/22/75	
244	57.6	WHEAT	Y	Y	5/22/75	
245	42.8	WHEAT	Y	Y	5/22/75	
246	71.2	WHEAT	Y	Y	5/22/75	
247	76.1	WHEAT	Y	Y	5/22/75	
248	35.5	WHEAT	Y	Y	5/22/75	
249	55.9	WHEAT	Y	Y	5/22/75	
250	42.2	WHEAT	Y	Y	5/22/75	
251	45.6	WHEAT	Y	Y	5/22/75	
252	5.4	WHEAT	Y	Y	5/22/75	

ORIGINAL PAGE IS
OF POOR QUALITY

SS 1986

TEST SITE # 35 (CHENQUETZ, S.D.)
LOCALITY OBSERVATION

GROUND TRUTH INVENTORY FORM

DATA RECORDED BETWEEN - 5/28/75 AND - 8/11

P.10
811

LOG SPACING (WHEAT IGEN)	211 PAPERCK	304 KINSEY	LAND USE CROP CODES	600 BLUMDDO FLAX
200 CATTLE (WHEAT IGEN) <td>212 CLAYTON<td>305 MISTY<td>410 WATSON<td>601 CERN</td></td></td></td>	212 CLAYTON <td>305 MISTY<td>410 WATSON<td>601 CERN</td></td></td>	305 MISTY <td>410 WATSON<td>601 CERN</td></td>	410 WATSON <td>601 CERN</td>	601 CERN
201 CATTLE (WHEAT IGEN) <td>213 CLAYTON<td>306 MISTY<td>411 WATSON<td>602 WATSON</td></td></td></td>	213 CLAYTON <td>306 MISTY<td>411 WATSON<td>602 WATSON</td></td></td>	306 MISTY <td>411 WATSON<td>602 WATSON</td></td>	411 WATSON <td>602 WATSON</td>	602 WATSON
202 CATTLE (WHEAT IGEN) <td>214 CLAYTON<td>307 MISTY<td>412 WATSON<td>603 WATSON</td></td></td></td>	214 CLAYTON <td>307 MISTY<td>412 WATSON<td>603 WATSON</td></td></td>	307 MISTY <td>412 WATSON<td>603 WATSON</td></td>	412 WATSON <td>603 WATSON</td>	603 WATSON
203 CATTLE (WHEAT IGEN) <td>215 CLAYTON<td>308 MISTY<td>413 WATSON<td>604 WATSON</td></td></td></td>	215 CLAYTON <td>308 MISTY<td>413 WATSON<td>604 WATSON</td></td></td>	308 MISTY <td>413 WATSON<td>604 WATSON</td></td>	413 WATSON <td>604 WATSON</td>	604 WATSON
204 CATTLE (WHEAT IGEN) <td>216 CLAYTON<td>309 MISTY<td>414 WATSON<td>605 WATSON</td></td></td></td>	216 CLAYTON <td>309 MISTY<td>414 WATSON<td>605 WATSON</td></td></td>	309 MISTY <td>414 WATSON<td>605 WATSON</td></td>	414 WATSON <td>605 WATSON</td>	605 WATSON
205 CATTLE (WHEAT IGEN) <td>217 CLAYTON<td>310 MISTY<td>415 WATSON<td>606 WATSON</td></td></td></td>	217 CLAYTON <td>310 MISTY<td>415 WATSON<td>606 WATSON</td></td></td>	310 MISTY <td>415 WATSON<td>606 WATSON</td></td>	415 WATSON <td>606 WATSON</td>	606 WATSON
206 CATTLE (WHEAT IGEN) <td>218 CLAYTON<td>311 MISTY<td>416 WATSON<td>607 WATSON</td></td></td></td>	218 CLAYTON <td>311 MISTY<td>416 WATSON<td>607 WATSON</td></td></td>	311 MISTY <td>416 WATSON<td>607 WATSON</td></td>	416 WATSON <td>607 WATSON</td>	607 WATSON
207 CATTLE (WHEAT IGEN) <td>219 CLAYTON<td>312 MISTY<td>417 WATSON<td>608 WATSON</td></td></td></td>	219 CLAYTON <td>312 MISTY<td>417 WATSON<td>608 WATSON</td></td></td>	312 MISTY <td>417 WATSON<td>608 WATSON</td></td>	417 WATSON <td>608 WATSON</td>	608 WATSON
208 CATTLE (WHEAT IGEN) <td>220 CLAYTON<td>313 MISTY<td>418 WATSON<td>609 WATSON</td></td></td></td>	220 CLAYTON <td>313 MISTY<td>418 WATSON<td>609 WATSON</td></td></td>	313 MISTY <td>418 WATSON<td>609 WATSON</td></td>	418 WATSON <td>609 WATSON</td>	609 WATSON
209 CATTLE (WHEAT IGEN) <td>221 CLAYTON<td>314 MISTY<td>419 WATSON<td>610 WATSON</td></td></td></td>	221 CLAYTON <td>314 MISTY<td>419 WATSON<td>610 WATSON</td></td></td>	314 MISTY <td>419 WATSON<td>610 WATSON</td></td>	419 WATSON <td>610 WATSON</td>	610 WATSON
210 CATTLE (WHEAT IGEN) <td>222 CLAYTON<td>315 MISTY<td>420 WATSON<td>611 WATSON</td></td></td></td>	222 CLAYTON <td>315 MISTY<td>420 WATSON<td>611 WATSON</td></td></td>	315 MISTY <td>420 WATSON<td>611 WATSON</td></td>	420 WATSON <td>611 WATSON</td>	611 WATSON
211 CATTLE (WHEAT IGEN) <td>223 CLAYTON<td>316 MISTY<td>421 WATSON<td>612 WATSON</td></td></td></td>	223 CLAYTON <td>316 MISTY<td>421 WATSON<td>612 WATSON</td></td></td>	316 MISTY <td>421 WATSON<td>612 WATSON</td></td>	421 WATSON <td>612 WATSON</td>	612 WATSON
212 CATTLE (WHEAT IGEN) <td>224 CLAYTON<td>317 MISTY<td>422 WATSON<td>613 WATSON</td></td></td></td>	224 CLAYTON <td>317 MISTY<td>422 WATSON<td>613 WATSON</td></td></td>	317 MISTY <td>422 WATSON<td>613 WATSON</td></td>	422 WATSON <td>613 WATSON</td>	613 WATSON
213 CATTLE (WHEAT IGEN) <td>225 CLAYTON<td>318 MISTY<td>423 WATSON<td>614 WATSON</td></td></td></td>	225 CLAYTON <td>318 MISTY<td>423 WATSON<td>614 WATSON</td></td></td>	318 MISTY <td>423 WATSON<td>614 WATSON</td></td>	423 WATSON <td>614 WATSON</td>	614 WATSON
214 CATTLE (WHEAT IGEN) <td>226 CLAYTON<td>319 MISTY<td>424 WATSON<td>615 WATSON</td></td></td></td>	226 CLAYTON <td>319 MISTY<td>424 WATSON<td>615 WATSON</td></td></td>	319 MISTY <td>424 WATSON<td>615 WATSON</td></td>	424 WATSON <td>615 WATSON</td>	615 WATSON
215 CATTLE (WHEAT IGEN) <td>227 CLAYTON<td>320 MISTY<td>425 WATSON<td>616 WATSON</td></td></td></td>	227 CLAYTON <td>320 MISTY<td>425 WATSON<td>616 WATSON</td></td></td>	320 MISTY <td>425 WATSON<td>616 WATSON</td></td>	425 WATSON <td>616 WATSON</td>	616 WATSON
216 CATTLE (WHEAT IGEN) <td>228 CLAYTON<td>321 MISTY<td>426 WATSON<td>617 WATSON</td></td></td></td>	228 CLAYTON <td>321 MISTY<td>426 WATSON<td>617 WATSON</td></td></td>	321 MISTY <td>426 WATSON<td>617 WATSON</td></td>	426 WATSON <td>617 WATSON</td>	617 WATSON
217 CATTLE (WHEAT IGEN) <td>229 CLAYTON<td>322 MISTY<td>427 WATSON<td>618 WATSON</td></td></td></td>	229 CLAYTON <td>322 MISTY<td>427 WATSON<td>618 WATSON</td></td></td>	322 MISTY <td>427 WATSON<td>618 WATSON</td></td>	427 WATSON <td>618 WATSON</td>	618 WATSON
218 CATTLE (WHEAT IGEN) <td>230 CLAYTON<td>323 MISTY<td>428 WATSON<td>619 WATSON</td></td></td></td>	230 CLAYTON <td>323 MISTY<td>428 WATSON<td>619 WATSON</td></td></td>	323 MISTY <td>428 WATSON<td>619 WATSON</td></td>	428 WATSON <td>619 WATSON</td>	619 WATSON
219 CATTLE (WHEAT IGEN) <td>231 CLAYTON<td>324 MISTY<td>429 WATSON<td>620 WATSON</td></td></td></td>	231 CLAYTON <td>324 MISTY<td>429 WATSON<td>620 WATSON</td></td></td>	324 MISTY <td>429 WATSON<td>620 WATSON</td></td>	429 WATSON <td>620 WATSON</td>	620 WATSON
220 CATTLE (WHEAT IGEN) <td>232 CLAYTON<td>325 MISTY<td>430 WATSON<td>621 WATSON</td></td></td></td>	232 CLAYTON <td>325 MISTY<td>430 WATSON<td>621 WATSON</td></td></td>	325 MISTY <td>430 WATSON<td>621 WATSON</td></td>	430 WATSON <td>621 WATSON</td>	621 WATSON
221 CATTLE (WHEAT IGEN) <td>233 CLAYTON<td>326 MISTY<td>431 WATSON<td>622 WATSON</td></td></td></td>	233 CLAYTON <td>326 MISTY<td>431 WATSON<td>622 WATSON</td></td></td>	326 MISTY <td>431 WATSON<td>622 WATSON</td></td>	431 WATSON <td>622 WATSON</td>	622 WATSON
222 CATTLE (WHEAT IGEN) <td>234 CLAYTON<td>327 MISTY<td>432 WATSON<td>623 WATSON</td></td></td></td>	234 CLAYTON <td>327 MISTY<td>432 WATSON<td>623 WATSON</td></td></td>	327 MISTY <td>432 WATSON<td>623 WATSON</td></td>	432 WATSON <td>623 WATSON</td>	623 WATSON
223 CATTLE (WHEAT IGEN) <td>235 CLAYTON<td>328 MISTY<td>433 WATSON<td>624 WATSON</td></td></td></td>	235 CLAYTON <td>328 MISTY<td>433 WATSON<td>624 WATSON</td></td></td>	328 MISTY <td>433 WATSON<td>624 WATSON</td></td>	433 WATSON <td>624 WATSON</td>	624 WATSON
224 CATTLE (WHEAT IGEN) <td>236 CLAYTON<td>329 MISTY<td>434 WATSON<td>625 WATSON</td></td></td></td>	236 CLAYTON <td>329 MISTY<td>434 WATSON<td>625 WATSON</td></td></td>	329 MISTY <td>434 WATSON<td>625 WATSON</td></td>	434 WATSON <td>625 WATSON</td>	625 WATSON
225 CATTLE (WHEAT IGEN) <td>237 CLAYTON<td>330 MISTY<td>435 WATSON<td>626 WATSON</td></td></td></td>	237 CLAYTON <td>330 MISTY<td>435 WATSON<td>626 WATSON</td></td></td>	330 MISTY <td>435 WATSON<td>626 WATSON</td></td>	435 WATSON <td>626 WATSON</td>	626 WATSON
226 CATTLE (WHEAT IGEN) <td>238 CLAYTON<td>331 MISTY<td>436 WATSON<td>627 WATSON</td></td></td></td>	238 CLAYTON <td>331 MISTY<td>436 WATSON<td>627 WATSON</td></td></td>	331 MISTY <td>436 WATSON<td>627 WATSON</td></td>	436 WATSON <td>627 WATSON</td>	627 WATSON
227 CATTLE (WHEAT IGEN) <td>239 CLAYTON<td>332 MISTY<td>437 WATSON<td>628 WATSON</td></td></td></td>	239 CLAYTON <td>332 MISTY<td>437 WATSON<td>628 WATSON</td></td></td>	332 MISTY <td>437 WATSON<td>628 WATSON</td></td>	437 WATSON <td>628 WATSON</td>	628 WATSON
228 CATTLE (WHEAT IGEN) <td>240 CLAYTON<td>333 MISTY<td>438 WATSON<td>629 WATSON</td></td></td></td>	240 CLAYTON <td>333 MISTY<td>438 WATSON<td>629 WATSON</td></td></td>	333 MISTY <td>438 WATSON<td>629 WATSON</td></td>	438 WATSON <td>629 WATSON</td>	629 WATSON
229 CATTLE (WHEAT IGEN) <td>241 CLAYTON<td>334 MISTY<td>439 WATSON<td>630 WATSON</td></td></td></td>	241 CLAYTON <td>334 MISTY<td>439 WATSON<td>630 WATSON</td></td></td>	334 MISTY <td>439 WATSON<td>630 WATSON</td></td>	439 WATSON <td>630 WATSON</td>	630 WATSON
230 CATTLE (WHEAT IGEN) <td>242 CLAYTON<td>335 MISTY<td>440 WATSON<td>631 WATSON</td></td></td></td>	242 CLAYTON <td>335 MISTY<td>440 WATSON<td>631 WATSON</td></td></td>	335 MISTY <td>440 WATSON<td>631 WATSON</td></td>	440 WATSON <td>631 WATSON</td>	631 WATSON
231 CATTLE (WHEAT IGEN) <td>243 CLAYTON<td>336 MISTY<td>441 WATSON<td>632 WATSON</td></td></td></td>	243 CLAYTON <td>336 MISTY<td>441 WATSON<td>632 WATSON</td></td></td>	336 MISTY <td>441 WATSON<td>632 WATSON</td></td>	441 WATSON <td>632 WATSON</td>	632 WATSON
232 CATTLE (WHEAT IGEN) <td>244 CLAYTON<td>337 MISTY<td>442 WATSON<td>633 WATSON</td></td></td></td>	244 CLAYTON <td>337 MISTY<td>442 WATSON<td>633 WATSON</td></td></td>	337 MISTY <td>442 WATSON<td>633 WATSON</td></td>	442 WATSON <td>633 WATSON</td>	633 WATSON
233 CATTLE (WHEAT IGEN) <td>245 CLAYTON<td>338 MISTY<td>443 WATSON<td>634 WATSON</td></td></td></td>	245 CLAYTON <td>338 MISTY<td>443 WATSON<td>634 WATSON</td></td></td>	338 MISTY <td>443 WATSON<td>634 WATSON</td></td>	443 WATSON <td>634 WATSON</td>	634 WATSON
234 CATTLE (WHEAT IGEN) <td>246 CLAYTON<td>339 MISTY<td>444 WATSON<td>635 WATSON</td></td></td></td>	246 CLAYTON <td>339 MISTY<td>444 WATSON<td>635 WATSON</td></td></td>	339 MISTY <td>444 WATSON<td>635 WATSON</td></td>	444 WATSON <td>635 WATSON</td>	635 WATSON
235 CATTLE (WHEAT IGEN) <td>247 CLAYTON<td>340 MISTY<td>445 WATSON<td>636 WATSON</td></td></td></td>	247 CLAYTON <td>340 MISTY<td>445 WATSON<td>636 WATSON</td></td></td>	340 MISTY <td>445 WATSON<td>636 WATSON</td></td>	445 WATSON <td>636 WATSON</td>	636 WATSON
236 CATTLE (WHEAT IGEN) <td>248 CLAYTON<td>341 MISTY<td>446 WATSON<td>637 WATSON</td></td></td></td>	248 CLAYTON <td>341 MISTY<td>446 WATSON<td>637 WATSON</td></td></td>	341 MISTY <td>446 WATSON<td>637 WATSON</td></td>	446 WATSON <td>637 WATSON</td>	637 WATSON
237 CATTLE (WHEAT IGEN) <td>249 CLAYTON<td>342 MISTY<td>447 WATSON<td>638 WATSON</td></td></td></td>	249 CLAYTON <td>342 MISTY<td>447 WATSON<td>638 WATSON</td></td></td>	342 MISTY <td>447 WATSON<td>638 WATSON</td></td>	447 WATSON <td>638 WATSON</td>	638 WATSON
238 CATTLE (WHEAT IGEN) <td>250 CLAYTON<td>343 MISTY<td>448 WATSON<td>639 WATSON</td></td></td></td>	250 CLAYTON <td>343 MISTY<td>448 WATSON<td>639 WATSON</td></td></td>	343 MISTY <td>448 WATSON<td>639 WATSON</td></td>	448 WATSON <td>639 WATSON</td>	639 WATSON
239 CATTLE (WHEAT IGEN) <td>251 CLAYTON<td>344 MISTY<td>449 WATSON<td>640 WATSON</td></td></td></td>	251 CLAYTON <td>344 MISTY<td>449 WATSON<td>640 WATSON</td></td></td>	344 MISTY <td>449 WATSON<td>640 WATSON</td></td>	449 WATSON <td>640 WATSON</td>	640 WATSON
240 CATTLE (WHEAT IGEN) <td>252 CLAYTON<td>345 MISTY<td>450 WATSON<td>641 WATSON</td></td></td></td>	252 CLAYTON <td>345 MISTY<td>450 WATSON<td>641 WATSON</td></td></td>	345 MISTY <td>450 WATSON<td>641 WATSON</td></td>	450 WATSON <td>641 WATSON</td>	641 WATSON
241 CATTLE (WHEAT IGEN) <td>253 CLAYTON<td>346 MISTY<td>451 WATSON<td>642 WATSON</td></td></td></td>	253 CLAYTON <td>346 MISTY<td>451 WATSON<td>642 WATSON</td></td></td>	346 MISTY <td>451 WATSON<td>642 WATSON</td></td>	451 WATSON <td>642 WATSON</td>	642 WATSON
242 CATTLE (WHEAT IGEN) <td>254 CLAYTON<td>347 MISTY<td>452 WATSON<td>643 WATSON</td></td></td></td>	254 CLAYTON <td>347 MISTY<td>452 WATSON<td>643 WATSON</td></td></td>	347 MISTY <td>452 WATSON<td>643 WATSON</td></td>	452 WATSON <td>643 WATSON</td>	643 WATSON
243 CATTLE (WHEAT IGEN) <td>255 CLAYTON<td>348 MISTY<td>453 WATSON<td>644 WATSON</td></td></td></td>	255 CLAYTON <td>348 MISTY<td>453 WATSON<td>644 WATSON</td></td></td>	348 MISTY <td>453 WATSON<td>644 WATSON</td></td>	453 WATSON <td>644 WATSON</td>	644 WATSON
244 CATTLE (WHEAT IGEN) <td>256 CLAYTON<td>349 MISTY<td>454 WATSON<td>645 WATSON</td></td></td></td>	256 CLAYTON <td>349 MISTY<td>454 WATSON<td>645 WATSON</td></td></td>	349 MISTY <td>454 WATSON<td>645 WATSON</td></td>	454 WATSON <td>645 WATSON</td>	645 WATSON
245 CATTLE (WHEAT IGEN) <td>257 CLAYTON<td>350 MISTY<td>455 WATSON<td>646 WATSON</td></td></td></td>	257 CLAYTON <td>350 MISTY<td>455 WATSON<td>646 WATSON</td></td></td>	350 MISTY <td>455 WATSON<td>646 WATSON</td></td>	455 WATSON <td>646 WATSON</td>	646 WATSON
246 CATTLE (WHEAT IGEN) <td>258 CLAYTON<td>351 MISTY<td>456 WATSON<td>647 WATSON</td></td></td></td>	258 CLAYTON <td>351 MISTY<td>456 WATSON<td>647 WATSON</td></td></td>	351 MISTY <td>456 WATSON<td>647 WATSON</td></td>	456 WATSON <td>647 WATSON</td>	647 WATSON
247 CATTLE (WHEAT IGEN) <td>259 CLAYTON<td>352 MISTY<td>457 WATSON<td>648 WATSON</td></td></td></td>	259 CLAYTON <td>352 MISTY<td>457 WATSON<td>648 WATSON</td></td></td>	352 MISTY <td>457 WATSON<td>648 WATSON</td></td>	457 WATSON <td>648 WATSON</td>	648 WATSON
248 CATTLE (WHEAT IGEN) <td>260 CLAYTON<td>353 MISTY<td>458 WATSON<td>649 WATSON</td></td></td></td>	260 CLAYTON <td>353 MISTY<td>458 WATSON<td>649 WATSON</td></td></td>	353 MISTY <td>458 WATSON<td>649 WATSON</td></td>	458 WATSON <td>649 WATSON</td>	649 WATSON
249 CATTLE (WHEAT IGEN) <td>261 CLAYTON<td>354 MISTY<td>459 WATSON<td>650 WATSON</td></td></td></td>	261 CLAYTON <td>354 MISTY<td>459 WATSON<td>650 WATSON</td></td></td>	354 MISTY <td>459 WATSON<td>650 WATSON</td></td>	459 WATSON <td>650 WATSON</td>	650 WATSON
250 CATTLE (WHEAT IGEN) <td>262 CLAYTON<td>355 MISTY<td>460 WATSON<td>651 WATSON</td></td></td></td>	262 CLAYTON <td>355 MISTY<td>460 WATSON<td>651 WATSON</td></td></td>	355 MISTY <td>460 WATSON<td>651 WATSON</td></td>	460 WATSON <td>651 WATSON</td>	651 WATSON
251 CATTLE (WHEAT IGEN) <td>263 CLAYTON<td>356 MISTY<td>461 WATSON<td>652 WATSON</td></td></td></td>	263 CLAYTON <td>356 MISTY<td>461 WATSON<td>652 WATSON</td></td></td>	356 MISTY <td>461 WATSON<td>652 WATSON</td></td>	461 WATSON <td>652 WATSON</td>	652 WATSON
252 CATTLE (WHEAT IGEN) <td>264 CLAYTON<td>357 MISTY<td>462 WATSON<td>653 WATSON</td></td></td></td>	264 CLAYTON <td>357 MISTY<td>462 WATSON<td>653 WATSON</td></td></td>	357 MISTY <td>462 WATSON<td>653 WATSON</td></td>	462 WATSON <td>653 WATSON</td>	653 WATSON
253 CATTLE (WHEAT IGEN) <td>265 CLAYTON<td>358 MISTY<td>463 WATSON<td>654 WATSON</td></td></td></td>	265 CLAYTON <td>358 MISTY<td>463 WATSON<td>654 WATSON</td></td></td>	358 MISTY <td>463 WATSON<td>654 WATSON</td></td>	463 WATSON <td>654 WATSON</td>	654 WATSON
254 CATTLE (WHEAT IGEN) <td>266 CLAYTON<td>359 MISTY<td>464 WATSON<td>655 WATSON</td></td></td></td>	266 CLAYTON <td>359 MISTY<td>464 WATSON<td>655 WATSON</td></td></td>	359 MISTY <td>464 WATSON<td>655 WATSON</td></td>	464 WATSON <td>655 WATSON</td>	655 WATSON
255 CATTLE (WHEAT IGEN) <td>267 CLAYTON<td>360 MISTY<td>465 WATSON<td>656 WATSON</td></td></td></td>	267 CLAYTON <td>360 MISTY<td>465 WATSON<td>656 WATSON</td></td></td>	360 MISTY <td>465 WATSON<td>656 WATSON</td></td>	465 WATSON <td>656 WATSON</td>	656 WATSON
256 CATTLE (WHEAT IGEN) <td>268 CLAYTON<td>361 MISTY<td>466 WATSON<td>657 WATSON</td></td></td></td>	268 CLAYTON <td>361 MISTY<td>466 WATSON<td>657 WATSON</td></td></td>	361 MISTY <td>466 WATSON<td>657 WATSON</td></td>	466 WATSON <td>657 WATSON</td>	657 WATSON
257 CATTLE (WHEAT IGEN) <td>269 CLAYTON<td>362 MISTY<td>467 WATSON<td>658 WATSON</td></td></td></td>	269 CLAYTON <td>362 MISTY<td>467 WATSON<td>658 WATSON</td></td></td>	362 MISTY <td>467 WATSON<td>658 WATSON</td></td>	467 WATSON <td>658 WATSON</td>	658 WATSON
258 CATTLE (WHEAT IGEN) <td>270 CLAYTON<td>363 MISTY<td>468 WATSON<td>659 WATSON</td></td></td></td>	270 CLAYTON <td>363 MISTY<td>468 WATSON<td>659 WATSON</td></td></td>	363 MISTY <td>468 WATSON<td>659 WATSON</td></td>	468 WATSON <td>659 WATSON</td>	659 WATSON
259 CATTLE (WHEAT IGEN) <td>271 CLAYTON<td>364 MISTY<td>469 WATSON<td>660 WATSON</td></td></td></td>	271 CLAYTON <td>364 MISTY<td>469 WATSON<td>660 WATSON</td></td></td>	364 MISTY <td>469 WATSON<td>660 WATSON</td></td>	469 WATSON <td>660 WATSON</td>	660 WATSON
260 CATTLE (WHEAT IGEN) <td>272 CLAYTON<td>365 MISTY<td>470 WATSON<td>661 WATSON</td></td></td></td>	272 CLAYTON <td>365 MISTY<td>470 WATSON<td>661 WATSON</td></td></td>	365 MISTY <td>470 WATSON<td>661 WATSON</td></td>	470 WATSON <td>661 WATSON</td>	661 WATSON
261 CATTLE (WHEAT IGEN) <td>273 CLAYTON<td>366 MISTY<td>471 WATSON<td>662 WATSON</td></td></td></td>	273 CLAYTON <td>366 MISTY<td>471 WATSON<td>662 WATSON</td></td></td>	366 MISTY <td>471 WATSON<td>662 WATSON</td></td>	471 WATSON <td>662 WATSON</td>	662 WATSON
262 CATTLE (WHEAT IGEN) <td>274 CLAYTON<td>367 MISTY<td>472 WATSON<td>663 WATSON</td></td></td></td>	274 CLAYTON <td>367 MISTY<td>472 WATSON<td>663 WATSON</td></td></td>	367 MISTY <td>472 WATSON<td>663 WATSON</td></td>	472 WATSON <td>663 WATSON</td>	663 WATSON
263 CATTLE (WHEAT IGEN) <td>275 CLAYTON<td>368 MISTY<td>473 WATSON<td>664 WATSON</td></td></td></td>	275 CLAYTON <td>368 MISTY<td>473 WATSON<td>664 WATSON</td></td></td>	368 MISTY <td>473 WATSON<td>664 WATSON</td></td>	473 WATSON <td>664 WATSON</td>	664 WATSON
264 CATTLE (WHEAT IGEN) <td>276 CLAYTON<td>369 MISTY<td>474 WATSON<td>665 WATSON</td></td></td></td>	276 CLAYTON <td>369 MISTY<td>474 WATSON<td>665 WATSON</td></td></td>	369 MISTY <td>474 WATSON<td>665 WATSON</td></td>	474 WATSON <td>665 WATSON</td>	665 WATSON
265 CATTLE (WHEAT IGEN) <td>277 CLAYTON<td>370 MISTY<td>475 WATSON<td>666 WATSON</td></td></td></td>	277 CLAYTON <td>370 MISTY<td>475 WATSON<td>666 WATSON</td></td></td>	370 MISTY <td>475 WATSON<td>666 WATSON</td></td>	475 WATSON <td>666 WATSON</td>	666 WATSON
266 CATTLE (WHEAT IGEN) <td>278 CLAYTON<td>371 MISTY<td>476 WATSON<td>667 WATSON</td></td></td></td>	278 CLAYTON <td>371 MISTY<td>476 WATSON<td>667 WATSON</td></td></td>	371 MISTY <td>476 WATSON<td>667 WATSON</td></td>	476 WATSON <td>667 WATSON</td>	667 WATSON
267 CATTLE (WHEAT IGEN) <td>279 CLAYTON<td>372 MISTY<td>477 WATSON<td>668 WATSON</td></td></td></td>	279 CLAYTON <td>372 MISTY<td>477 WATSON<td>668 WATSON</td></td></td>	372 MISTY <td>477 WATSON<td>668 WATSON</td></td>	477 WATSON <td>668 WATSON</td>	668 WATSON
268 CATTLE (WHEAT IGEN) <td>280 CLAYTON<td>373 MISTY<td>478 WATSON<td>669 WATSON</td></td></td></td>	280 CLAYTON <td>373 MISTY<td>478 WATSON<td>669 WATSON</td></td></td>	373 MISTY <td>478 WATSON<td>669 WATSON</td></td>	478 WATSON <td>669 WATSON</td>	669 WATSON
269 CATTLE (WHEAT IGEN) <td>281 CLAYTON<td>374 MISTY<td>479 WATSON<td>670 WATSON</td></td></td></td>	281 CLAYTON <td>374 MISTY<td>479 WATSON<td>670 WATSON</td></td></td>	374 MISTY <td>479 WATSON<td>670 WATSON</td></td>	479 WATSON <td>670 WATSON</td>	670 WATSON
270 CATTLE (WHEAT IGEN) <td>282 CLAYTON<td>375 MISTY<td>480 WATSON<td>671 WATSON</td></td></td></td>	282 CLAYTON <td>375 MISTY<td>480 WATSON<td>671 WATSON</td></td></td>	375 MISTY <td>480 WATSON<td>671 WATSON</td></td>	480 WATSON <td>671 WATSON</td>	671 WATSON
271 CATTLE (WHEAT IGEN) <td>283 CLAYTON<td>376 MISTY<td>481 WATSON<td>672 WATSON</td></td></td></td>	283 CLAYTON <td>376 MISTY<td>481 WATSON<td>672 WATSON</td></td></td>	376 MISTY <td>481 WATSON<td>672 WATSON</td></td>	481 WATSON <td>672 WATSON</td>	672 WATSON
272 CATTLE (WHEAT IGEN) <td>284 CLAYTON<td>377 MISTY<td>482 WATSON<td>673 WATSON</td></td></td></td>	284 CLAYTON <td>377 MISTY<td>482 WATSON<td>673 WATSON</td></td></td>	377 MISTY <td>482 WATSON<td>673 WATSON</td></td>	482 WATSON <td>673 WATSON</td>	673 WATSON
273 CATTLE (WHEAT IGEN) <td>285 CLAYTON<td>378 MISTY<td>483 WATSON<td>674 WATSON</td></td></td></td>	285 CLAYTON <td>378 MISTY<td>483 WATSON<td>674 WATSON</td></td></td>	378 MISTY <td>483 WATSON<td>674 WATSON</td></td>	483 WATSON <td>674 WATSON</td>	674 WATSON
274 CATTLE (WHEAT IGEN) <td>286 CLAYTON<td>379 MISTY<td>484 WATSON<td>675 WATSON</td></td></td></td>	286 CLAYTON <td>379 MISTY<td>484 WATSON<td>675 WATSON</td></td></td>	379 MISTY <td>484 WATSON<td>675 WATSON</td></td>	484 WATSON <td>675 WATSON</td>	675 WATSON
275 CATTLE (WHEAT IGEN) <td>287 CLAYTON<td>380 MISTY<td>485 WATSON<td>676 WATSON</td></td></td></td>	287 CLAYTON <td>380 MISTY<td>485 WATSON<td>676 WATSON</td></td></td>	380 MISTY <td>485 WATSON<td>676 WATSON</td></td>	485 WATSON <td>676 WATSON</td>	676 WATSON
276 CATTLE (WHEAT IGEN) <td>288 CLAYTON<td>381 MISTY<td>486 WATSON<td>677 WATSON</td></td></td></td>	288 CLAYTON <td>381 MISTY<td>486 WATSON<td>677 WATSON</td></td></td>	381 MISTY <td>486 WATSON<td>677 WATSON</td></td>	486 WATSON <td>677 WATSON</td>	677 WATSON
277 CATTLE (WHEAT IGEN) <td>289 CLAYTON<td>382 MISTY<td>487 WATSON<td>678 WATSON</td></td></td></td>	289 CLAYTON <td>382 MISTY<td>487 WATSON<td>678 WATSON</td></td></td>	382 MISTY <td>487 WATSON<td>678 WATSON</td></td>	487 WATSON <td>678 WATSON</td>	678 WATSON
278 CATTLE (WHEAT IGEN) <td>290 CLAYTON<td>383 MISTY<td>488 WATSON<td>679 WATSON</td></td></td></td>	290 CLAYTON <td>383 MISTY<td>488 WATSON<td>679 WATSON</td></td></td>	383 MISTY <td>488 WATSON<td>679 WATSON</td></td>	488 WATSON <td>679 WATSON</td>	679 WATSON
279 CATTLE (WHEAT IGEN) <td>291 CLAYTON<td>384 MISTY<td>489 WATSON<td>680 WATSON</td></td></td></td>	291 CLAYTON <td>384 MISTY<td>489 WATSON<td>680 WATSON</td></td></td>	384 MISTY <td>489 WATSON<td>680 WATSON</td></td>	489 WATSON <td>680 WATSON</td>	680 WATSON
280 CATTLE (WHEAT IGEN) <td>292 CLAYTON<td>385 MISTY<td>490 WATSON<td>681 WATSON</td></td></td></td>	292 CLAYTON <td>385 MISTY<td>490 WATSON<td>681 WATSON</td></td></td>	385 MISTY <td>490 WATSON<td>681 WATSON</td></td>	490 WATSON <td>681 WATSON</td>	681 WATSON

MAP REFERENCE # OF FIELD	ACREAGE	LAND USE CROP CODE	IRRIGATED	FERTILIZED	PLANTING DATE MONTH DAY YEAR	COMMENTS
253	32.6	5	Y	Y	5-1-75	11-2-75, 6"
254	8.0	5	Y	Y	5-1-75	11-2-75, 6"
255	23.4	5	Y	Y	5-1-75	11-2-75, 6"
256	9.6	5	Y	Y	5-1-75	11-2-75, 6"
257	5.5	5	Y	Y	5-1-75	11-2-75, 6"
258	22.7	5	Y	Y	5-1-75	11-2-75, 6"
259	26.9	5	Y	Y	5-1-75	11-2-75, 6"
260	17.8	5	Y	Y	5-1-75	11-2-75, 6"
261	21.0	5	Y	Y	5-1-75	11-2-75, 6"
262	34.2	5	Y	Y	5-1-75	11-2-75, 6"
263	41.7	5	Y	Y	5-1-75	11-2-75, 6"
264	35.2	5	Y	Y	5-1-75	11-2-75, 6"
265	15.0	5	Y	Y	5-1-75	11-2-75, 6"
266	27.1	5	Y	Y	5-1-75	11-2-75, 6"
267	12.7	5	Y	Y	5-1-75	11-2-75, 6"
268	48.6	5	Y	Y	5-1-75	11-2-75, 6"
269	4.8	5	Y	Y	5-1-75	11-2-75, 6"
270	62.0	5	Y	Y	5-1-75	11-2-75, 6"
271	8.4	5	Y	Y	5-1-75	11-2-75, 6"
272	9.7	5	Y	Y	5-1-75	11-2-75, 6"
273	1.9	5	Y	Y	5-1-75	11-2-75, 6"
274	56.4	5	Y	Y	5-1-75	11-2-75, 6"
275	22.3	5	Y	Y	5-1-75	11-2-75, 6"
276	---	---	Y	Y	5-1-75	11-2-75, 6"
277	---	---	Y	Y	5-1-75	11-2-75, 6"
278	---	---	Y	Y	5-1-75	11-2-75, 6"
279	---	---	Y	Y	5-1-75	11-2-75, 6"
280	---	---	Y	Y	5-1-75	11-2-75, 6"

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COMMENTS: UNUSUAL CONDITIONS, MISCELLANEOUS INFORMATION,
QUESTIONS, PROBLEMS, SCHEDULING SPACE, ETC.

P. 11
y 11

Field # 15 - All alfalfa now. Much of corn field # 13 was planted before 1970. Rest was planted in 1970 and 1971

50% Bluegrass pasture includes Native? Tan grass for hay. If there is a planting date it is some grass. If just
double it is Native grass for hay.

Field # 237 - 24.8 is total field acreage. Includes crop rotation 13.5 acres. Presley is nurse crop with new seeding
of grass and alfalfa. But you still would be all grass alfalfa for hay.

Appendix B

Data Set A (Reston Mirrors)

Resampled at 1:1 Pixel Aspect Ratio

Section B.1 SUMMARY OF EFFORT

This appendix contains results of additional processing requested by personnel at the NASA Goddard Space Flight Center during their review of the draft of the body of this report. The additional processing consisted of resampling one band of the original data of the Reston mirrors of Data Set A to produce arrays with output pixels having a 1:1 aspect ratio. The corresponding arrays presented earlier in this report have aspect ratios of 1.4:1 (approximate ground distance per pixel of 57.2 meters horizontally by 79.0 meter vertically).

The resampling to produce the desired arrays was performed using both the nearest neighbor and cubic convolution resampling algorithms and was done so that output pixels represent 50.8 meters square. The results were plotted on film using 100 μ m square spot, contact printed (Figure B.1), and enlarged by 10X (Figures B.2 and B.3). Pixel value print-outs of the area immediately surrounding the mirrors in the two resampled versions were generated and are presented in Figures B.4 and B.5.

Also included in this appendix are results which compare the spatial frequency content of 1:1 data with that of 1.4:1 data. These results are based on power spectra of the resampled versions of the Reston mirrors area and were generated under funding from IBM's Internal Research and Development (IRAD) program in digital image processing. The method of computing the spectra was identical to that done for data set B in the body of this report. For all cases in this appendix, the spectra were averaged over 64 lines.

Figures B.6 through B.25 present pairs of plots. The first plot of each pair is that of a line which passes through the lower right (southeastern) mirror. The second plot of each pair is a power spectrum averaged over 64 lines of data centered on the line that is plotted. The plotted line should not be interpreted as being typical of all 64 lines used to compute the spectrum. Because it does contain the mirror spike, the plotted line may have more power in the high frequencies. All plots are based on data representing the same ground area. Because the number of pixels representing that ground area varies with pixel scale and aspect ratio, the plots vary in size. One pair of plots is presented for horizontal lines, and one for vertical lines for each of the following versions of the data: original, nearest neighbor 1.4:1, nearest neighbor 1:1, cubic convolution 1.4:1, and cubic convolution 1:1.

Section B.2 EVALUATION AND CONCLUSIONS

Inspection of the generated data led to the following conclusions:

1. The spreading and overshoot properties of the cubic convolution resampling algorithm noticed in the 1.4:1 data in the main report are clearly present in the 1:1 data in this appendix. The spreading is seen in the southeastern mirror, which affects six horizontal lines in the cubic convolution 1:1 output data (Figure B.3), although it is present in only one horizontal line in the original data. The overshoot is seen in the black borders above and below the mirrors. The intensity values assigned to certain pixels surrounding the mirrors are, for nearest neighbor data, in the range 13-15. Due to the overshoot, the same pixels in cubic convolution are in the range 1-4.
2. The power spectrum plots show that there is significantly more high frequency power in the vertical direction than in the horizontal direction in all cases. This is true both of the spectra in this appendix and of those in the body of the report. The greater high frequency power in the vertical direction is to be expected because of the horizontal oversampling and because of the fact that, vertically, detector-to-detector differences would appear as high-frequency noise. Because of this result, and the fact that cubic convolution is a mild low pass filter, it is not surprising that the attenuation of the highest frequencies is greater in the vertical direction (a factor of about 4 or 5) than it is in the horizontal direction (a factor of less than 2) when comparing the 1.4:1 cubic convolution data to the original.

A comparison of the spectra generated from original, nearest neighbor 1:1, and nearest neighbor 1.4:1 data shows that the power contained in a given spatial frequency is approximately the same in the three cases. The 1:1 data results in a better estimate of the spectrum. It has somewhat less power in the high frequencies because, with the increased sampling rate used to achieve the 1:1 aspect ratio, the folding frequency is moved out in the spectrum and the components folded back in have less power.

A similar situation is noticed comparing the cubic convolution 1.4:1 and 1:1 spectra. Low frequency power terms are very similar, but, in the 1:1 case where the sampling was done more densely, the power in the high frequency terms is slightly lower than the power in the corresponding 1.4:1 terms due to the lack of additional folding.

In a comparison of the nearest neighbor 1:1 spectra with the cubic convolution 1:1 spectra, the greater power in the high frequency terms of the former is indicative of the fact that nearest neighbor does not filter out the high frequency mirror image components of the spectrum which appear due to the original sampling operation.

OR NN CC



Figure B.1.

Contact Print of Reston Mirrors,
Pixel Aspect Ratio 1:1 in Resampled Data,
OR, NN, CC-1800-15081-5

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One pixel = 50.8 meters square
Approximate scale of image is 1:50,000

Figure P.2. 10X Enlargement of Boston Mirrors,
Pixel Aspect Ratio 1:1, NN-1800-15081-5



One pixel = 50.8 meters square
Approximate scale of image is 1:50,000

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Figure E.3. 10X Enlargement of Peston Mirrors,
Pixel Aspect Ratio 1:1, CC-1800-15081-5

PRINTOUT OF INTENSITY VALUES OF PIXELS SURROUNDING SAMPLE 59. LINE 79

130

**Figure B.5: Pixel Value Printouts around Reston Mirrors,
Pixel Aspect Ratio 1:1, CC-1800-15081-5**

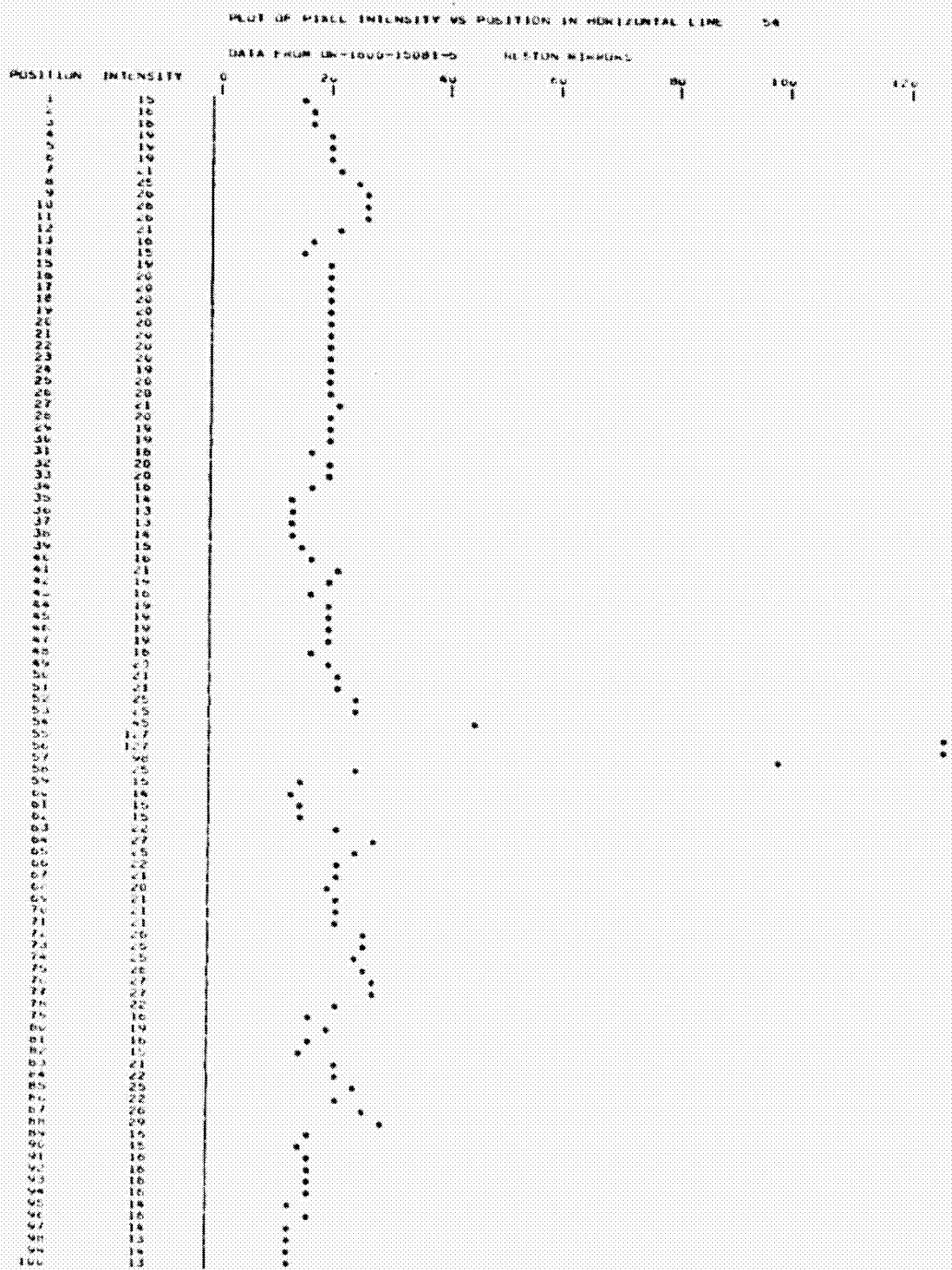
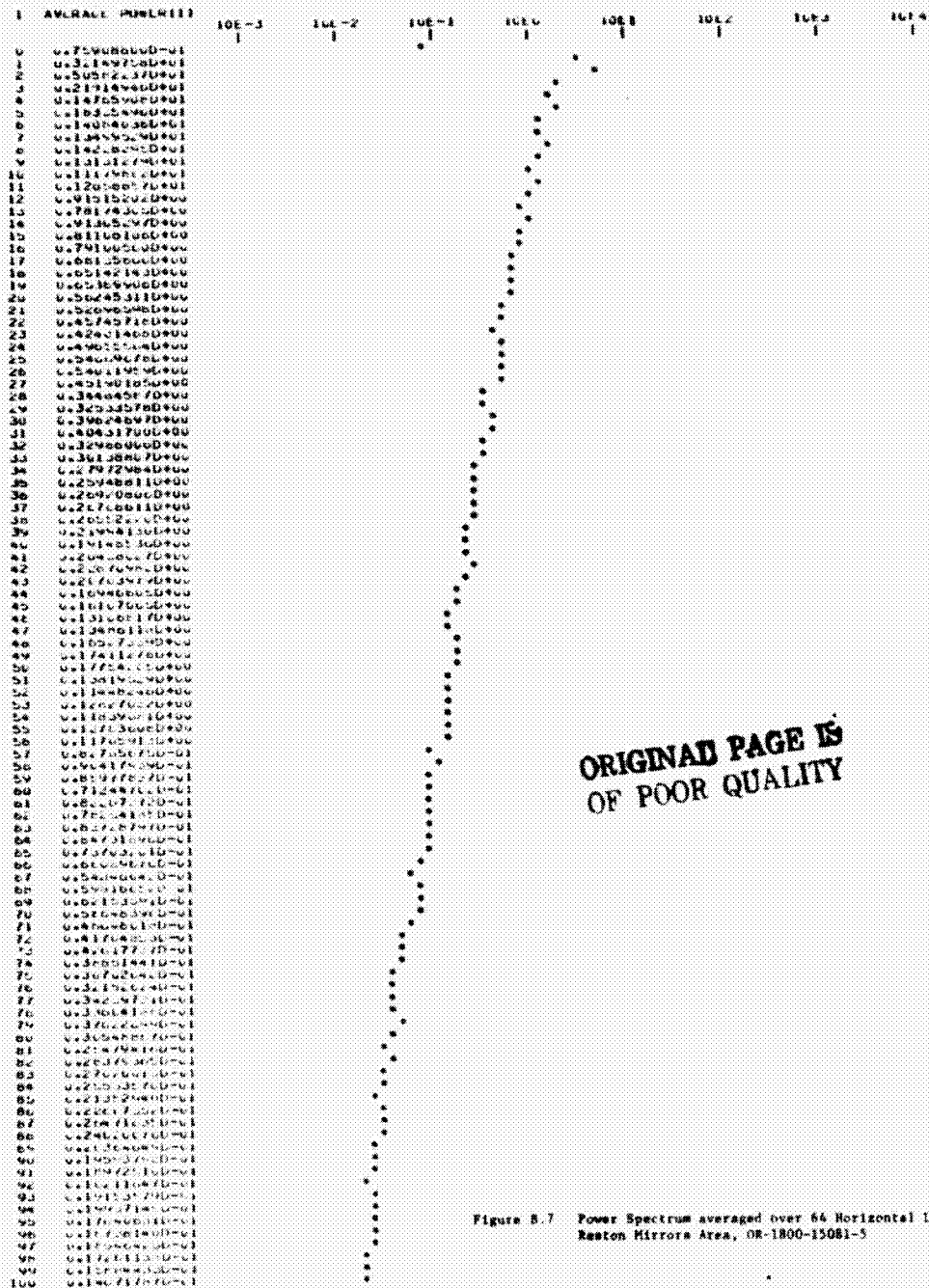


Figure B.6 Plot of Horizontal Line through Reason Mirror,
OR-1800-15081-5

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SPATIAL FREQUENCY ANALYSIS OF HORIZONTAL LINE: (OR-1800-15081)-1 REGION 1, 4, 11
 POWER AVERAGED OVER 64 LINES WHERE AVERAGE POWER(1) = (SUM(11002 * 1111002)/11002 LINES
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Figure 8.7 Power Spectrum averaged over 64 Horizontal Lines,
 Ranton Mirrors Area, OR-1800-15081-5



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Figure 7 is a plot of the power spectrum averaged over 64 horizontal lines in the Repton Mirror Area, NN-1800-15081-5, Resample 1. The x-axis is labeled "AVERAGE PORTAL" and ranges from 10E-3 to 10E+3. The y-axis is labeled "POWER" and ranges from 10E-3 to 10E+3. The plot shows a power spectrum with a peak around 10E+1. A handwritten note in the upper right corner reads: "ORIGINAL PAGE 4 OF POOR QUALITY".

Figure 8 - Power Spectrum averaged over 64 Horizontal Lines.
Renton Mirrors Area, NN-1800-15081-5, Resampled at 1.4:1

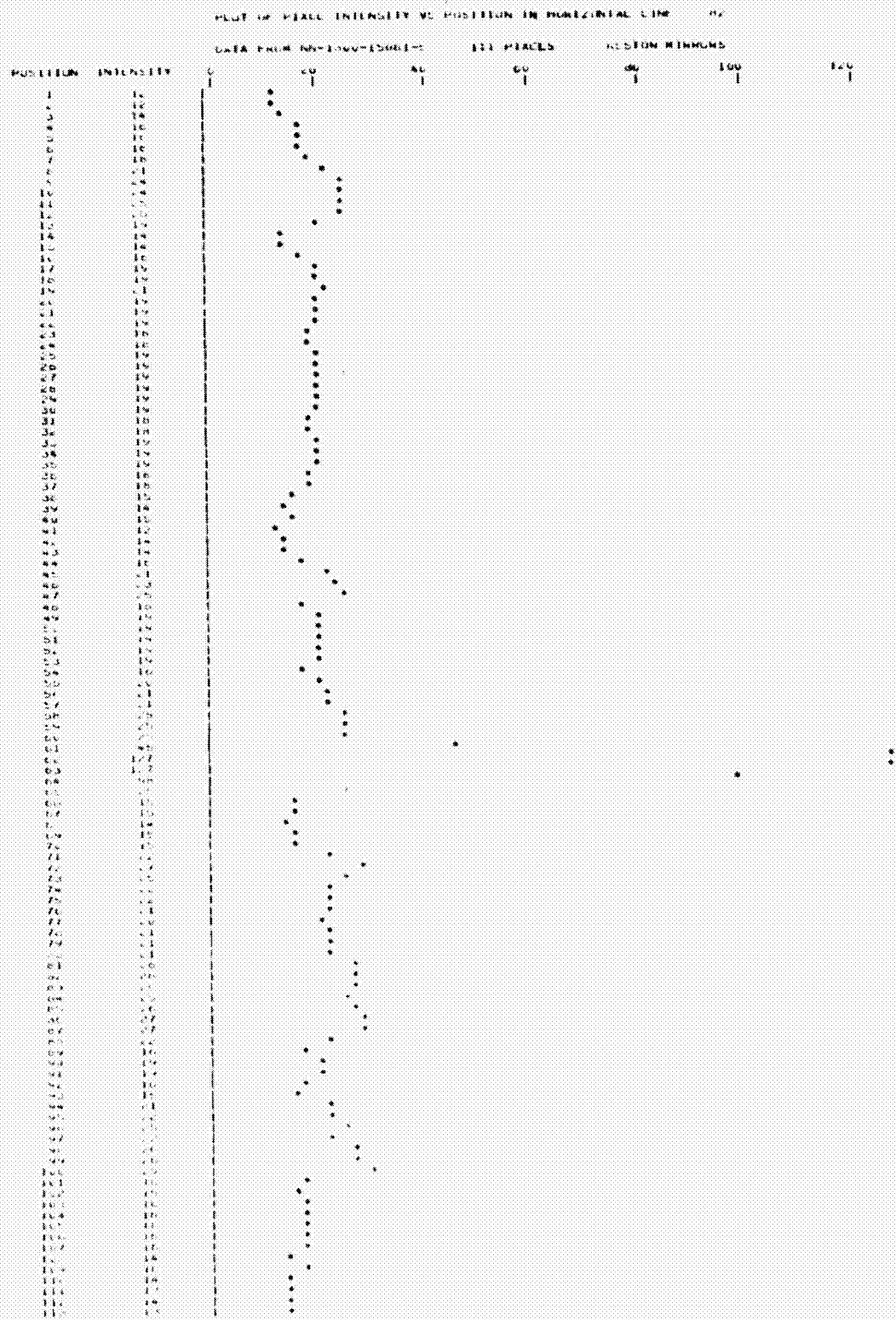


Figure B.10 Plot of Horizontal Line through Reston Hierarchy, NN-1800-150R1-5, Resampled at 1:1

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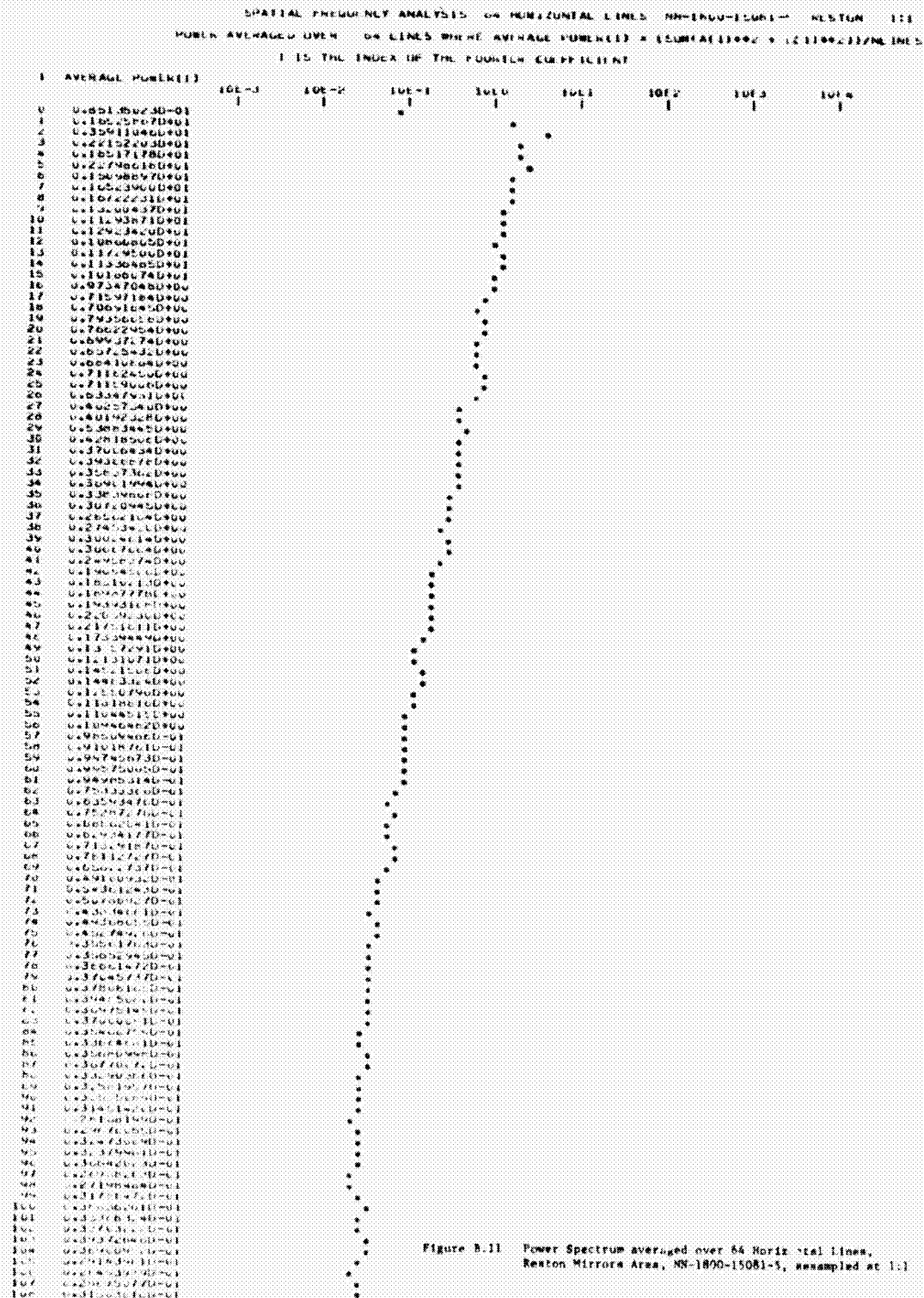


Figure 8.11 Power Spectrum averaged over 64 Horizontal lines.
Reston Mirror Area, NN-1800-15081-5, sampled at 1:1

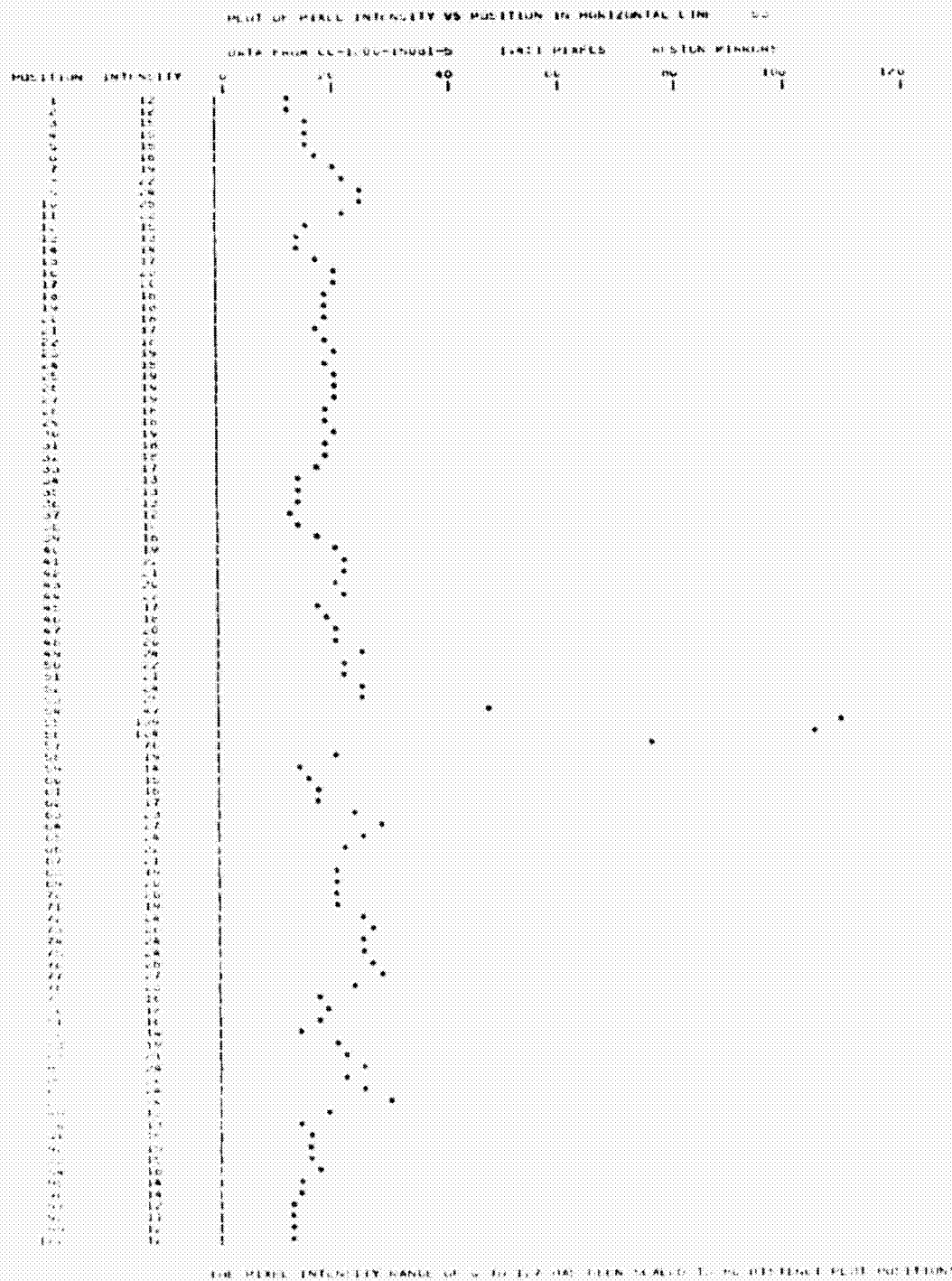


Figure 8.12 Plot of Horizontal Line through Reston Mirror,
CC-1800-15081-5, Resampled at 1.4:1

SPATIAL FREQUENCY ANALYSIS OF HORIZONTAL LINES CC-1800-15081-5 RESTON 14411
 POWER AVERAGED OVER 64 LINES WHERE AVERAGE RUMPLES = 1.50UM/INCH ± 0.11UM/INCH
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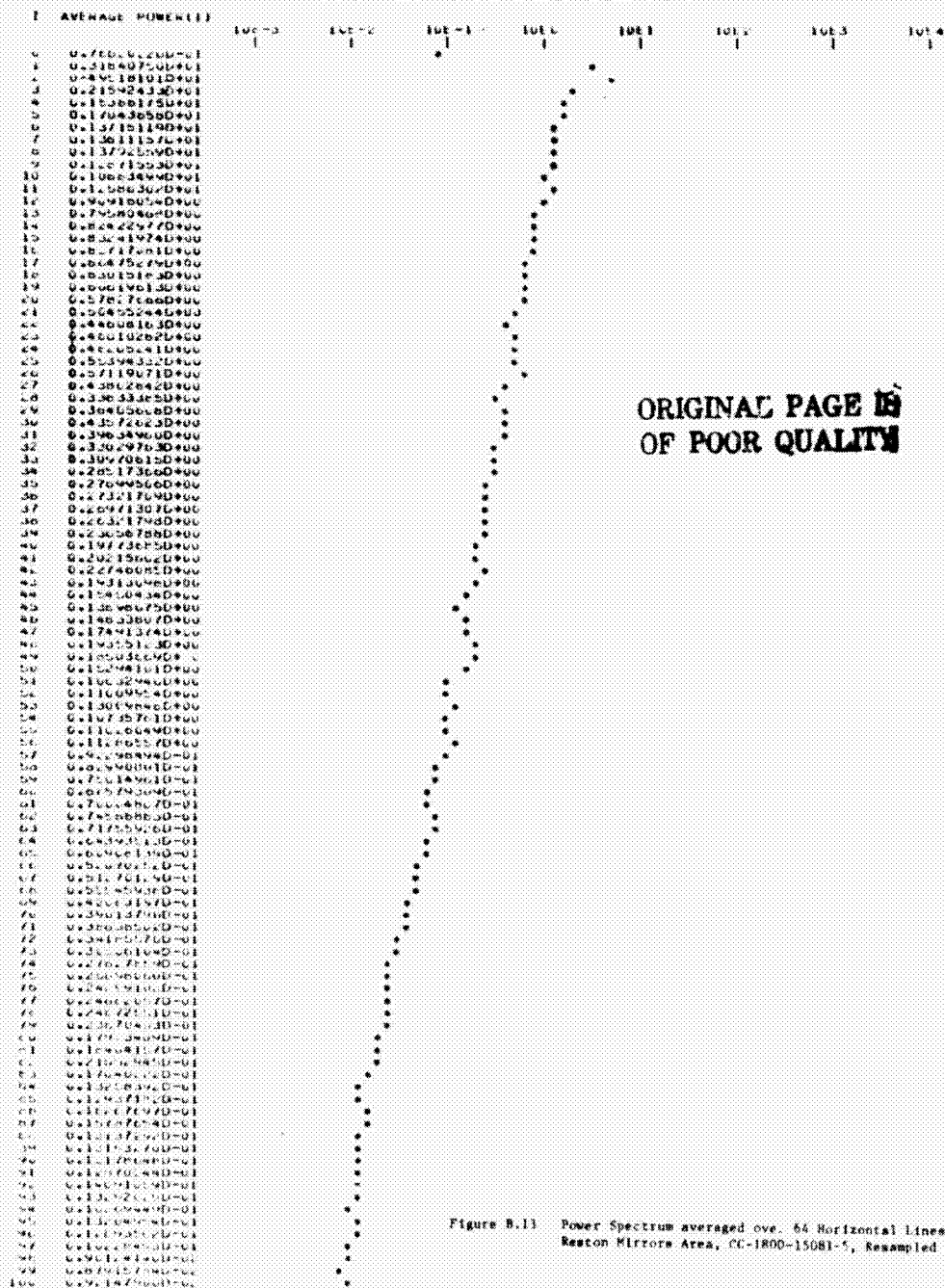
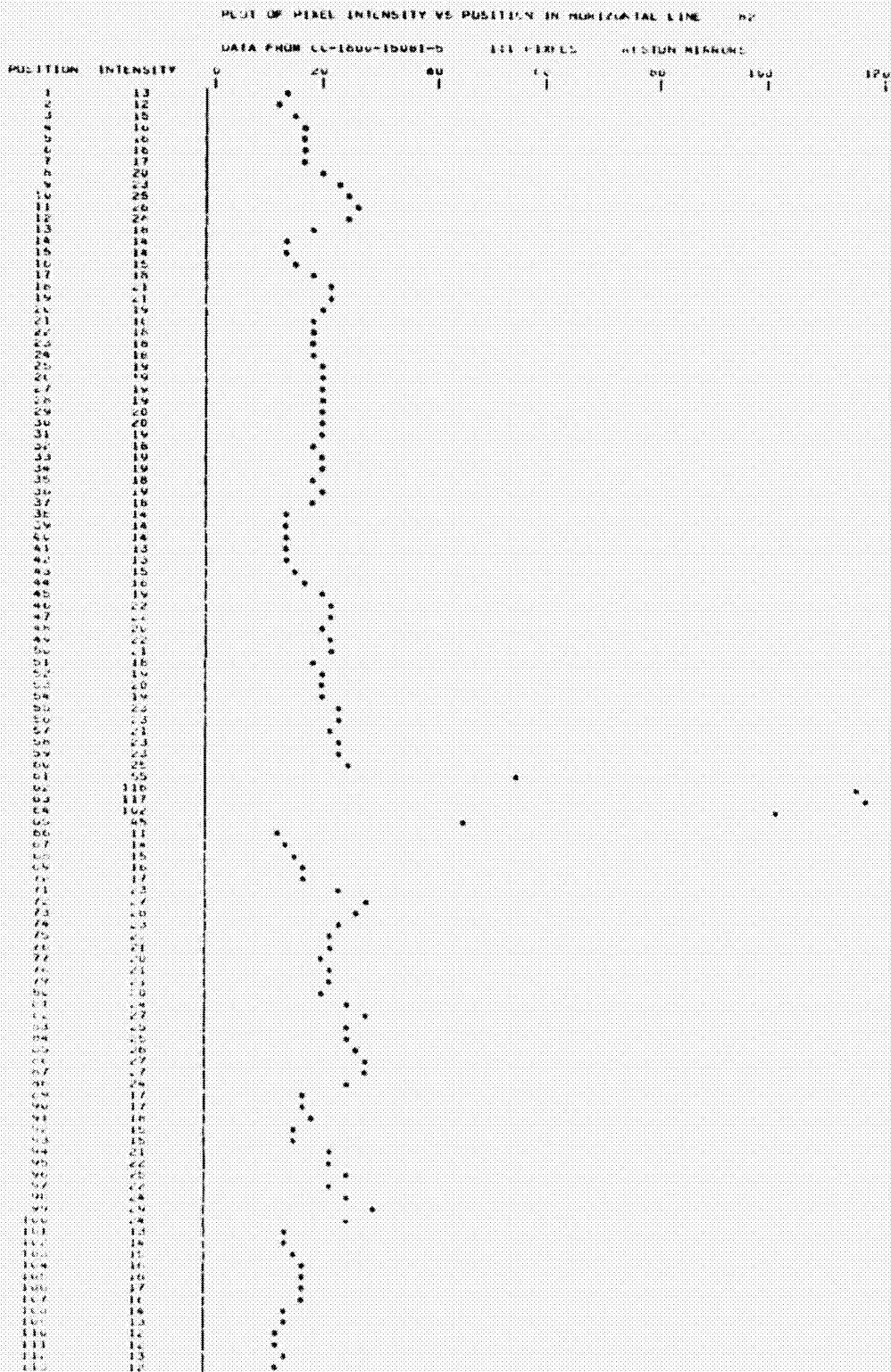


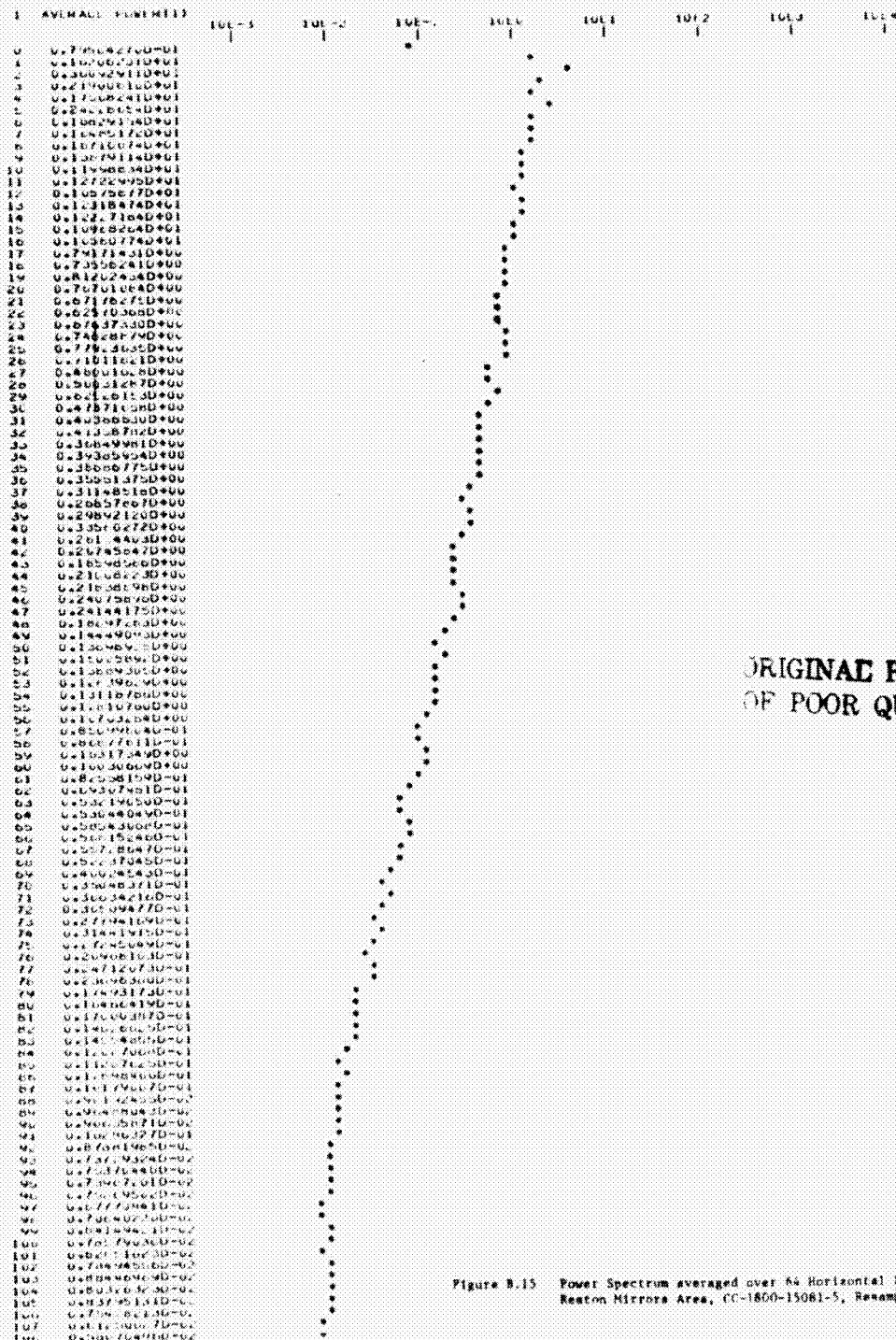
Figure 8.11 Power Spectrum averaged over 64 Horizontal Lines, Reston Mirror Area, CC-1800-15081-5, Resampled at 1.4:1



THE PIXEL INTENSITY RANGE OF 0 TO 127 HAS BEEN CHANGED TO 00 DETERMINED BY INSPECTION

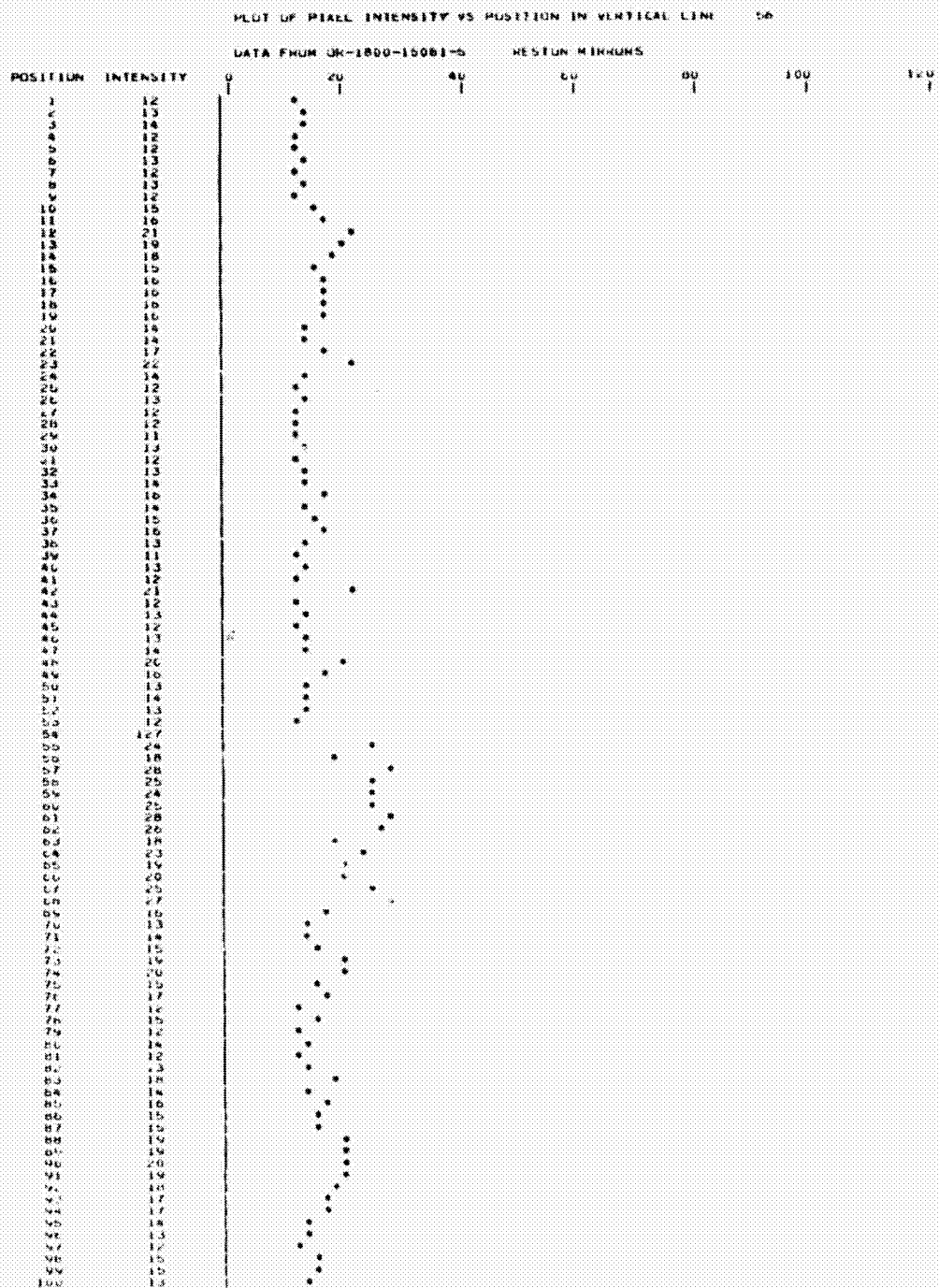
Figure B.14 Plot of Horizontal Line through Reason Mirrors, CC-1800-15081-5, Resampled at 1:1

SPATIAL FREQUENCY ANALYSIS OF HORIZONTAL LINES CC-1800-15081-5 SECTION 1:1
POWER AVERAGED OVER 64 LINES WHERE AVERAGE POWERED = (100000000 + 111111111) / 64
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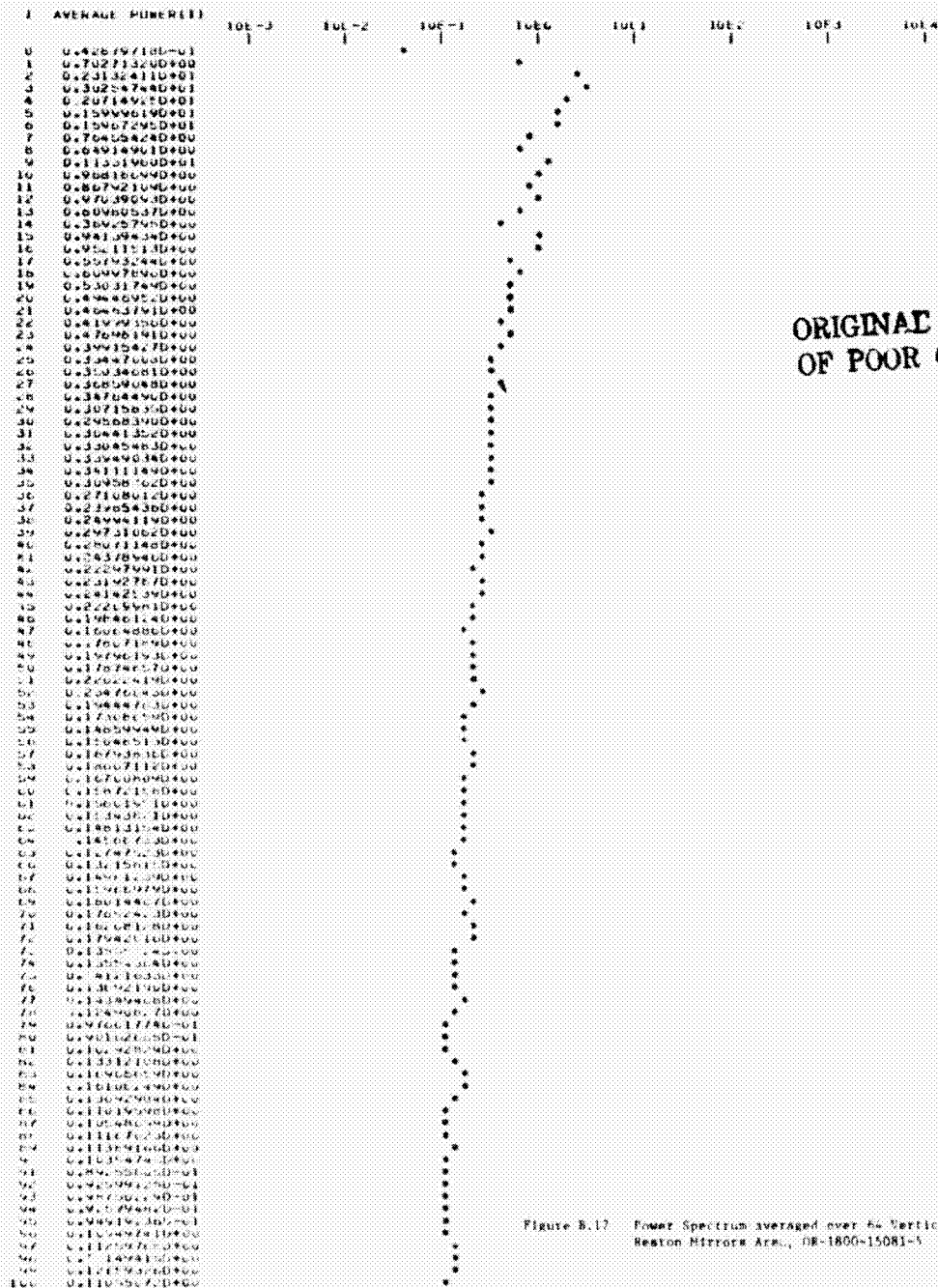
Figure B.15 Power Spectrum averaged over 64 Horizontal lines,
Ranton Mirrors Area, CC-1800-15081-5, Resampled at 1:1



THE PIXEL INTENSITY RANGE OF 0 TO 127 HAS BEEN SELECTED TO BE DISTINCT FROM POSITION

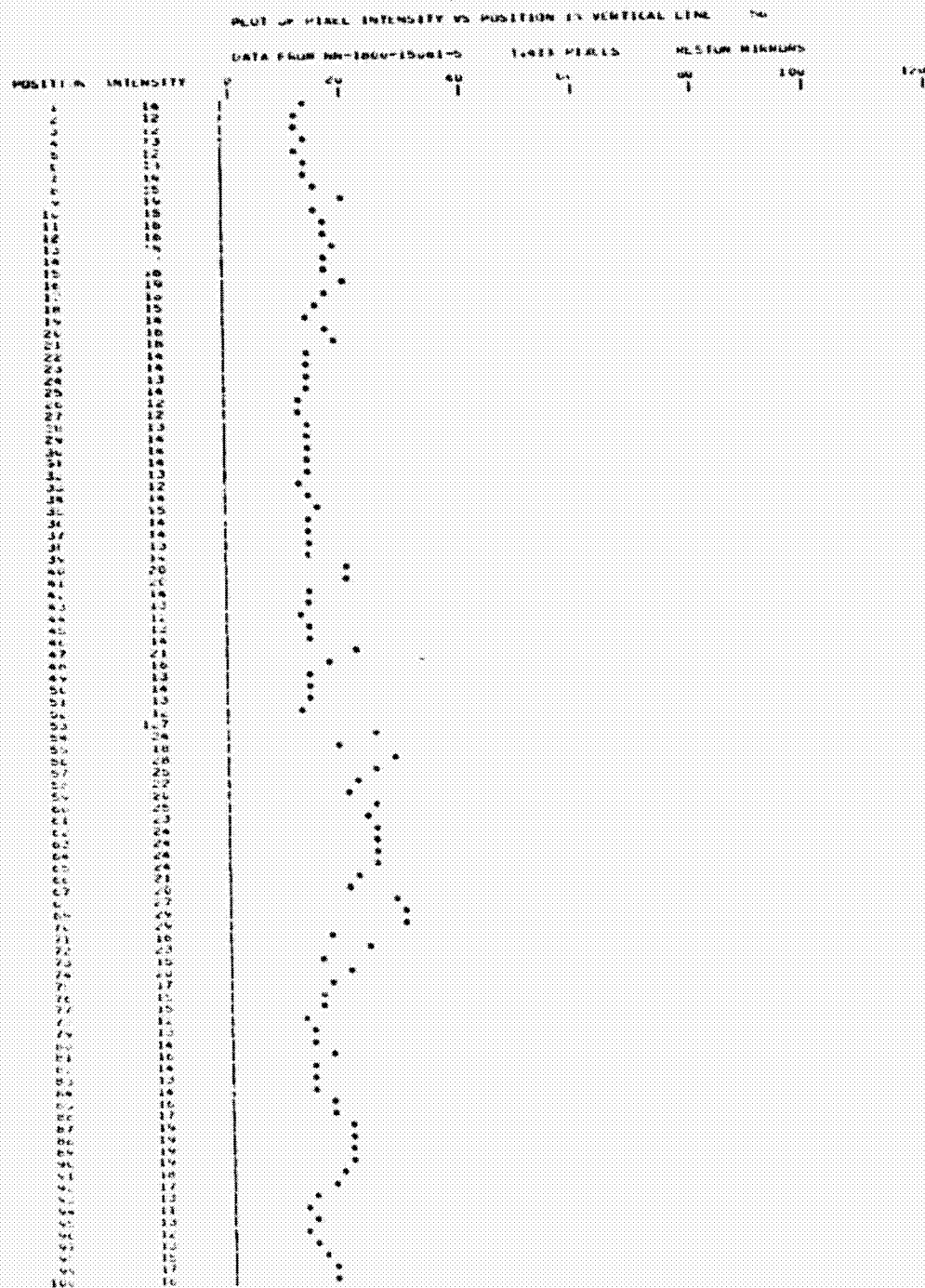
Figure 8.16 Plot of Vertical Line through Repton Mirrors,
OR-1800-150b1-5

SPATIAL FREQUENCY ANALYSIS OF VERTICAL LINES. (18-1800-15081-5) RESOLUTION 1:4:1
 POWER AVERAGED OVER 64 LINES WHERE AVERAGE POWER(L) = (SUM(A(L))**2 + (L)**2)/64
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Figure 8.17 Power Spectrum averaged over 64 Vertical lines.
 Reston Mirror Arm., 18-1800-15081-5



THE PIRAL INTENSITY RANGE OF 0 TO 127 HAS BEEN SCALED TO A DISTANCE FOUR POSITIONS

Figure B.18 Part 1: Vertical Line through Reason Mirrors, MN-1800-15081-5, Resampled at 1.4:1

Figure 8-19 Power Spectrum averaged over 84 Vertical Reston Mirrors Area, NN-1800-150R1-S, R

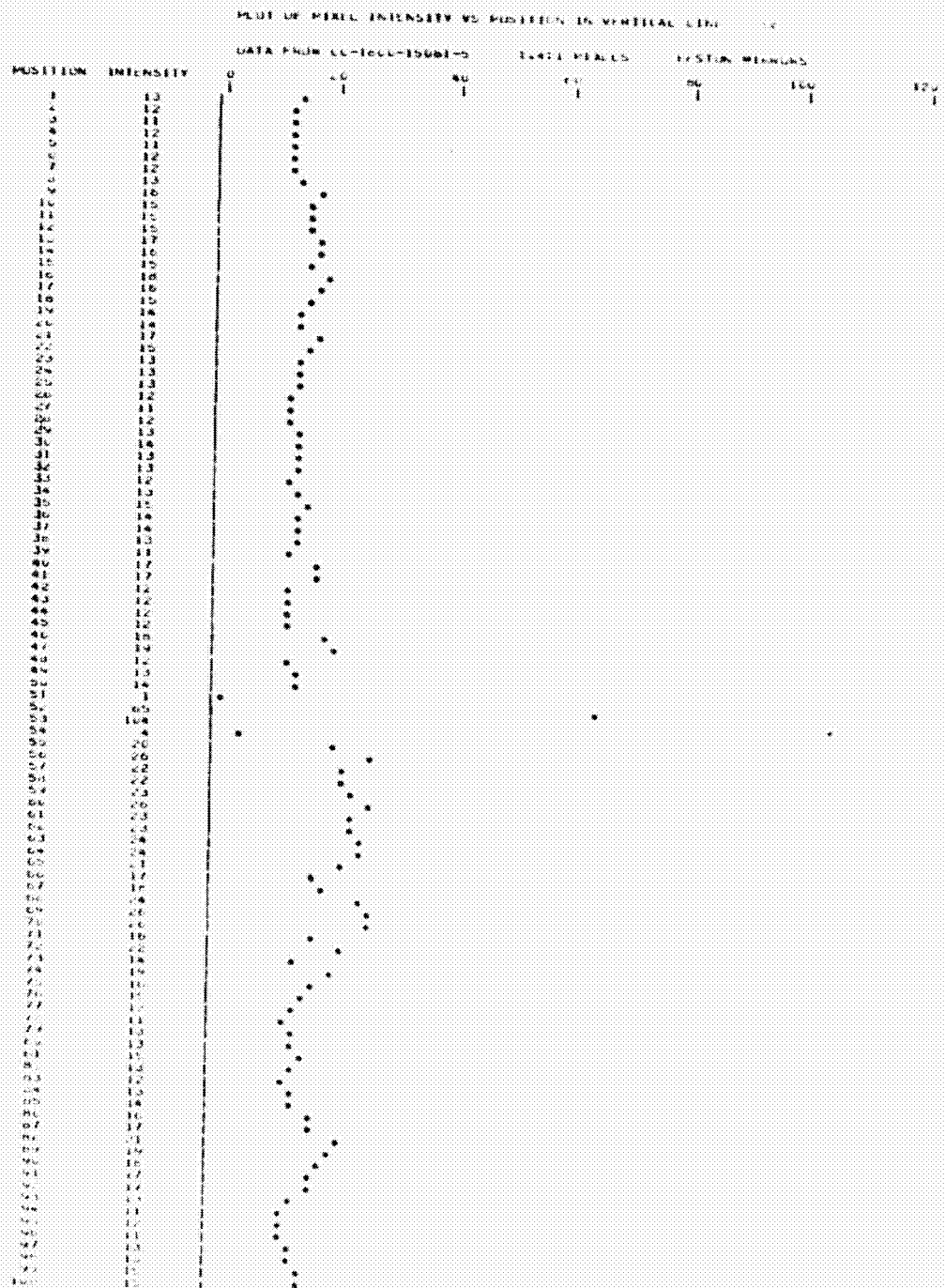
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Figure B.19 Power Spectrum averaged over 64 Vertical Lines,
Reston Mirrors Area, NN-1800-15081-5, Resampled at 1.5:1

Figure 8.21: Power Spectrum averaged over 66 Vertical Feet. The graph displays the Power Spectral Density (PSD) in dBm/Hz against Frequency in Hz. The x-axis is logarithmic, spanning from 1 Hz to 10,000 Hz. The y-axis is linear, ranging from -100 dBm/Hz to 0 dBm/Hz. The spectrum shows a noisy signal with a broad peak around 100 Hz and a sharp decline in power above 1,000 Hz. A label 'ORIGINAL OF POOR' is present on the right side of the plot area.

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Figure B.21 Power Spectrum averaged over 66 Vertical Lines,
Rest Area, SR-100-150N-5, Resampled at 1.1



THE PIXEL INTENSITY RANGE OF 0 TO 127 HAS BEEN SCALED TO THE DISTANCE FROM 1 TO 100

Figure B.22 Plot of Vertical line through Boston Mirror, CC-1800-15081-5, Resampled at 1.4:1

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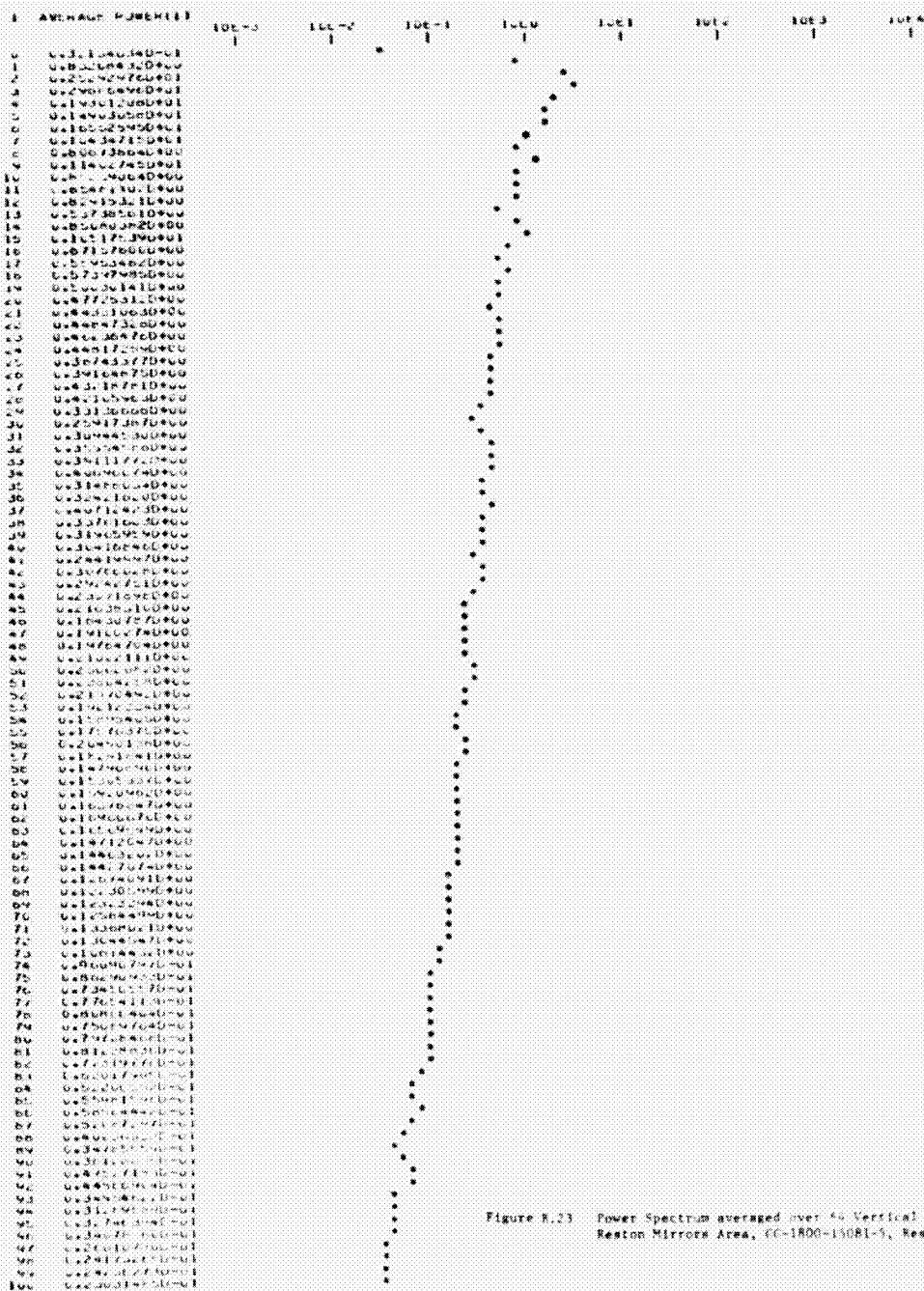
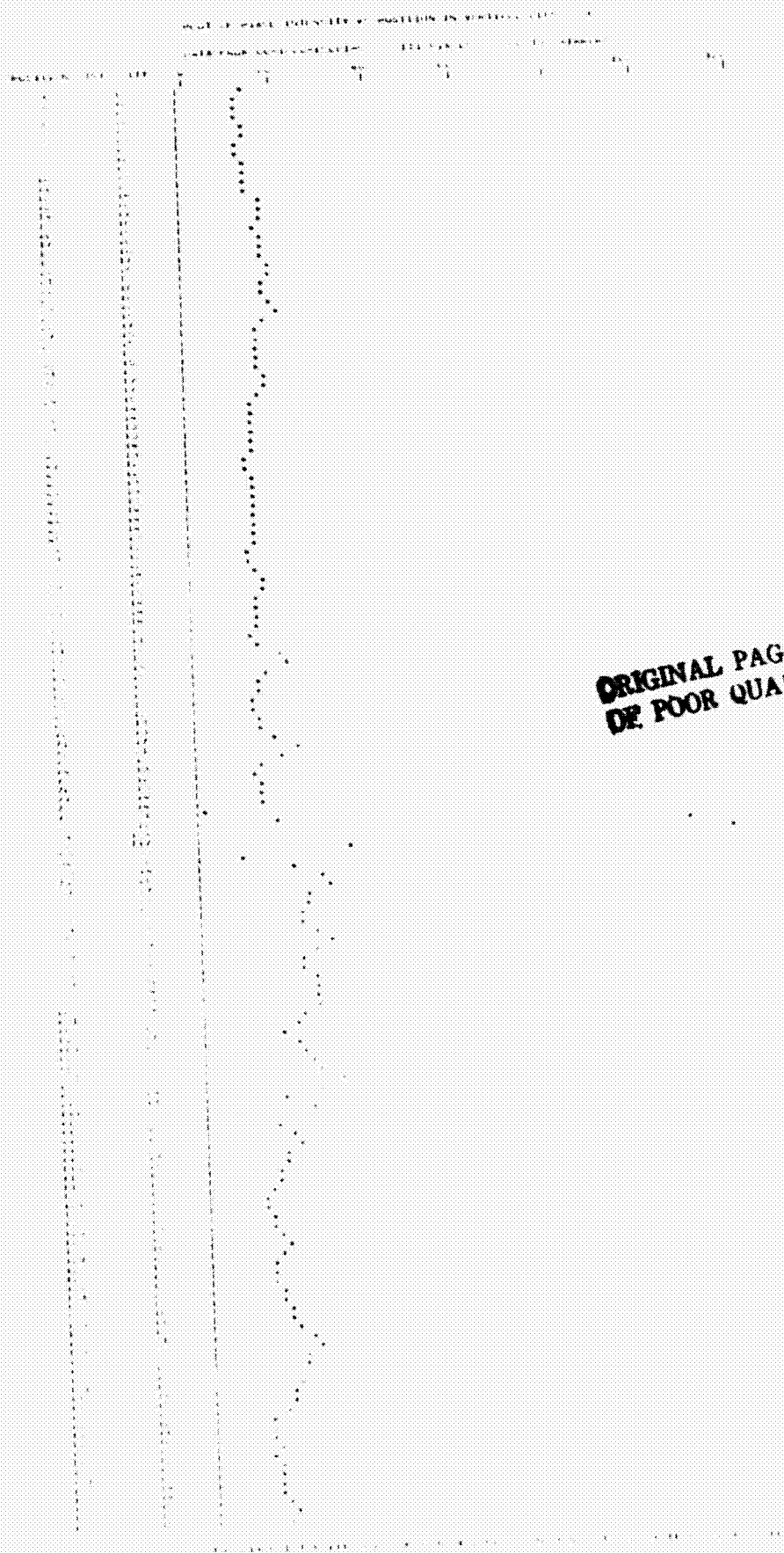
$$I = \frac{\text{SPATIAL FREQUENCY ANALYSIS ON WIGGLE LINE}^2}{\text{POWER AVERAGE OVER WIGGLE LINE} \times \text{AVERAGE POWER}} = \frac{(\text{SUM}(I1100) + I11000) / \text{LINE}100}{1}$$


Figure R.23 Power Spectrum averaged over 40 Vertical Lines,
Reston Mirrors Area, CC-1800-13081-5, Resampled at 1.4:



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Figure 8.14 Plot of Serial Line through Resistor Network
(1000-1500 Hz, Resistor Network)

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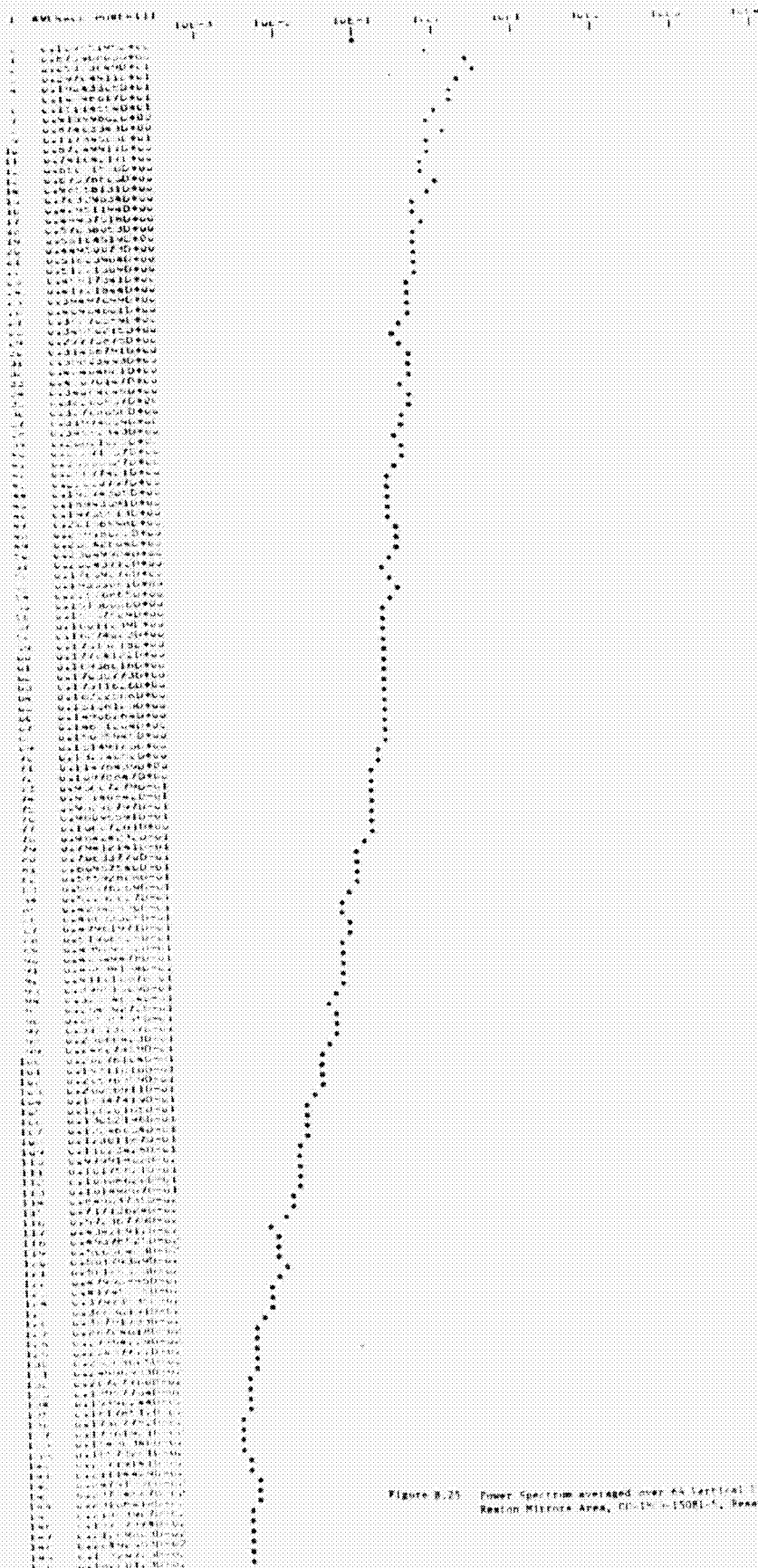
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Figure B.25: Power Spectrum averaged over 64 Vertical Lines.
Region Mirror Area, 0.14 to 15081.4, Resampled at 1.1